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(54) PORTABLE ELECTRONIC EQUIPMENT, ELECTRONIC EQUIPMENT, OSCILLATION GENERATOR, REPORTING METHOD BY OSCILLATION, AND

REPORT CONTROL METHOD

(57)Abstract:
PROBLEM TO BE SOLVED: To enable a user to easily confirm acceptance of an operation input or response of electronic equipment to the operation input without seeing a picture.
SOLUTION: A CPU 113 drives an oscillation actuator 115 through a driving signal generation circuit 114 to generate oscillation when detecting acceptance of an operation input to a touch panel 102 or an operation key. The touch panel 102 and the operation key are oscillated in the direction perpendicular to their surfaces by this oscillation. Or the casing of a PDA(Personal Digital Assistant) 10 is oscillated. The oscillation actuator 115 is provided with a weight body, a support member which supports this weight body so that it can be reciprocated in air and is connected to a member to be oscillated of the PDA 10 like the touch panel 102 or the casing of a base member of the oscillation actuator 115 brought into contact with the above member to be oscillated, and a mechanism which gives kinetic power like magnetic power or electrostatic power to reciprocate the weight body.

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3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] Pocket mold electronic equipment characterized by providing the control unit which receives an actuation input, the tremulor which gives vibration to the grasping section of the pocket mold electronic equipment concerned, and the oscillating control means which generates vibration from said tremulor when it is detected that the actuation input to said control unit was received.

[Claim 2] Said tremulor is pocket mold electronic equipment according to claim 1 characterized by providing a pyramid of medulla oblongata, the supporter material connected with the base member of the tremulor concerned which touches said grasping section or said grasping section while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata.

[Claim 3] Said oscillating control means is pocket mold electronic equipment according to claim 1 characterized by impressing the driving signal which resonates this tremulor or said grasping section to said tremulor when driving said tremulor and generating vibration.

[Claim 4] Said tremulor is pocket mold electronic equipment according to claim 1 characterized by being the motor which attached the eccentric spindle in the revolving shaft.

[Claim 5] Said oscillating control means is pocket mold electronic equipment according to claim 4 characterized by making the rotational frequency of the motor concerned in agreement with the vibration frequency from which this motor or said grasping section starts resonance when rotating said motor and generating vibration.

[Claim 6] Said oscillating control means is pocket mold electronic equipment according to claim 4 or 5 characterized by stopping rotation of said motor so that said eccentric spindle may stop in the same location when stopping rotation of said motor.

[Claim 7] It is pocket mold electronic equipment according to claim 1 provide further an assignment means to specify whether oscillating information is performed according to an actuation input, and carry out [generating vibration from said tremulor according to detection of an actuation input, and] as the description when it is specified that said oscillating control means performs oscillating information with said assignment means.

[Claim 8] The control unit which receives an actuation input, and the tremulor which gives vibration to said control unit, When it is detected that the actuation input to said

control unit was received, the oscillating control means which generates vibration from said tremulor is provided. Said tremulor A pyramid of medulla oblongata and the supporter material connected with the base member of the tremulor concerned which touches said control unit or said control unit while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, Pocket mold electronic equipment characterized by providing a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata.

[Claim 9] Said tremulor is pocket mold electronic equipment according to claim 8 characterized by vibrating said control unit to the contact direction of the operator at the time of the actuation input to said control unit, and its opposite direction.

[Claim 10] Said oscillating control means is pocket mold electronic equipment according to claim 8 characterized by generating vibration from the predetermined period for 1 or less second, and said tremulor after detecting that the actuation input to said control unit was received.

[Claim 11] Said oscillating control means is pocket mold electronic equipment according to claim 8 or 10 characterized by impressing the driving signal which resonates this tremulor or said control unit to said tremulor when driving said tremulor and generating vibration.

[Claim 12] It is pocket mold electronic equipment given in any 1 claim of claims 8-11 which said control unit is a touch panel and are characterized by said tremulor vibrating the display means which said touch panel or said touch panel possesses.

[Claim 13] It is pocket mold electronic equipment given in any 1 claim of claims 8-11 which said control unit has a handler and are characterized by said tremulor vibrating said handler.

[Claim 14] It is pocket mold electronic equipment according to claim 8 provide further an assignment means to specify whether oscillating information is performed according to an actuation input, and carry out [generating vibration from said tremulor according to detection of an actuation input, and] as the description when it is specified that said oscillating control means performs oscillating information with said assignment means.

[Claim 15] Pocket mold electronic equipment characterized by providing the oscillating control means which generates vibration from said tremulor when it is detected that activation of the control unit which receives an actuation input, the tremulor which gives an operator vibration, and the processing directed by the actuation input to said control unit was completed.

[Claim 16] Said oscillating control means is pocket mold electronic equipment according to claim 15 characterized by changing the oscillatory-type voice of said tremulor according to the activation result of said processing.

[Claim 17] Said tremulor is pocket mold electronic equipment according to claim 15 or 16 characterized by giving vibration to said control unit or the grasping section of the

pocket mold electronic equipment concerned.

[Claim 18] It is pocket mold electronic equipment according to claim 15 or 16 characterized by providing a movement force generating means for said tremulor to give vibration to said control unit, and to give the supporter material connected with the base member of the tremulor concerned which touches said control unit or said control unit while the tremulor concerned supported the pyramid of medulla oblongata and said pyramid of medulla oblongata possible [a reciprocating motion] in the air, and the movement force for making it reciprocate to said pyramid of medulla oblongata.

[Claim 19] Said tremulor is what gives vibration to the grasping section of the pocket mold electronic equipment concerned. The tremulor concerned A pyramid of medulla oblongata and the supporter material connected with the base member of the tremulor concerned which touches said grasping section or said grasping section while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, Pocket mold electronic equipment according to claim 15 or 16 characterized by providing a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata.

[Claim 20] It is pocket mold electronic equipment according to claim 15 or 16 which said tremulor gives vibration to said control unit or the grasping section of the pocket mold electronic equipment concerned, and is characterized by impressing the driving signal which resonates either this tremulor, said control unit and said grasping section to said tremulor when said oscillating control means drives said tremulor and it generates vibration.

[Claim 21] The control unit which receives an actuation input, and the 1st tremulor which gives vibration to said control unit, When it is detected as the 2nd tremulor which gives vibration to the grasping section of the pocket mold electronic equipment concerned that the actuation input to said control unit was received Pocket mold electronic equipment characterized by providing the gap beforehand specified by the operator among said 1st tremulor and said 2nd tremulor, or the oscillating control means which generates vibration from the above on the other hand.

[Claim 22] The control unit which receives an actuation input, and the 1st tremulor which gives vibration to said control unit, The 2nd tremulor which gives vibration to the grasping section of the pocket mold electronic equipment concerned, and a detection means to detect whether the pocket mold electronic equipment concerned is grasped by the operator, When it is detected that the actuation input to said control unit was received Pocket mold electronic equipment which has responded to the detection result by said detection means among said 1st tremulor and said 2nd tremulor, and is characterized by providing the oscillating control means which the above is chosen [control means] on the other hand in a gap, and generates vibration from the selected tremulor concerned.

[Claim 23] Said oscillating control means is pocket mold electronic equipment according to claim 22 characterized by generating vibration only from said 1st tremulor when it is detected that the pocket mold electronic equipment concerned is not grasped by the operator with said detection means when it is detected that the actuation input to said control unit was received.

[Claim 24] Said 1st tremulor is pocket mold electronic equipment according to claim 21 or 22 characterized by providing a pyramid of medulla oblongata, the supporter material connected with the base member of the tremulor concerned which touches said control unit or said control unit while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata.

[Claim 25] Said 2nd tremulor is pocket mold electronic equipment according to claim 21 or 22 characterized by providing a pyramid of medulla oblongata, the supporter material connected with the base member of the tremulor concerned which touches said grasping section or said grasping section while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata.

[Claim 26] Said tremulor is pocket mold electronic equipment given in any 1 claim of claims 8, 18, and 24 characterized by making it reciprocate to said pyramid of medulla oblongata according to the movement force generated from said movement force generating means, and making said control unit produce vibration acceleration as reaction force of the reciprocating motion concerned, or giving the vibration acceleration produced in said base member as reaction force of said reciprocating motion to said control unit.

[Claim 27] Said tremulor is pocket mold electronic equipment given in any 1 claim of claims 2, 19, and 25 characterized by making it reciprocate to said pyramid of medulla oblongata according to the movement force generated from said movement force generating means, and making said grasping section produce vibration acceleration as reaction force of the reciprocating motion concerned, or giving the vibration acceleration produced in said base member as reaction force of said reciprocating motion to said grasping section.

[Claim 28] Said supporter material is pocket mold electronic equipment given in any 1 claim of claims 8, 18, and 24 characterized by being constituted using the elastic body, connecting one edge with said control unit or said base member, and connecting the other end with said pyramid of medulla oblongata.

[Claim 29] Said supporter material is pocket mold electronic equipment given in any 1 claim of claims 2, 19, and 25 characterized by being constituted using the elastic body, connecting one edge with said grasping section or said base member, and connecting

the other end with said pyramid of medulla oblongata.

[Claim 30] Said tremulor is pocket mold electronic equipment given in any 1 claim of claims 2, 8, 18, 19, 24, and 25 characterized by providing further the guide device of said pyramid of medulla oblongata for making a linear reciprocating motion perform to said pyramid of medulla oblongata.

[Claim 31] Said movement force generating means is pocket mold electronic equipment given in any 1 claim of claims 2, 8, 18, 19, 24, and 25 characterized by generating magnetism as said movement force.

[Claim 32] Said movement force generating means is pocket mold electronic equipment given in any 1 claim of claims 2, 8, 18, 19, 24, and 25 characterized by generating electrostatic force as said movement force.

[Claim 33] Said tremulor is pocket mold electronic equipment given in any 1 claim of claims 2, 8, 18, 19, 24, and 25 characterized by providing further the resistance grant member which is made to perform a linear reciprocating motion to said pyramid of medulla oblongata, always contacts a side face parallel to the direction of the reciprocating motion of said pyramid of medulla oblongata which reciprocates, and gives contact resistance to said pyramid of medulla oblongata.

[Claim 34] Said tremulor is pocket mold electronic equipment given in any 1 claim of claims 2, 8, 18, 19, 24, 25, and 30 characterized by providing further a brake means to contact said pyramid of medulla oblongata and to stop the reciprocating motion of the pyramid of medulla oblongata concerned when generating of the movement force from said movement force generating means stops.

[Claim 35] It is pocket mold electronic equipment given in any 1 claim of claims 2, 8, 18, 19, 24, 25, and 30 characterized by for said tremulor possessing the coil made to generate magnetism as said movement force generating means, and said pocket mold electronic equipment possessing further the short-circuiting means which short-circuits the input edge of said coil when supply of a current is suspended to said coil.

[Claim 36] It is pocket mold electronic equipment given in any 1 claim of claims 2, 8, 18, 19, 24, and 25 which said movement force generating means makes generate magnetism as said movement force, and are characterized by said tremulor having held said pyramid of medulla oblongata, said supporter material, and said movement force generating means in the space sealed in the case where it has the antimagnetic effectiveness.

[Claim 37] It is pocket mold electronic equipment given in any 1 claim of claims 2, 8, 18, 19, 24, and 25 which said movement force generating means makes generate magnetism as said movement force, and are characterized by constituting said pyramid of medulla oblongata using a permanent magnet.

[Claim 38] The display panel which the touch panel piled up, and the tremulor installed in said display panel, The elastic member which supports said display panel possible

[vibration] by vibration generated from said tremulor and which was constituted using the elastic body, When it is detected that the touch actuation to said touch panel was received, the oscillating control means which generates vibration from said tremulor is provided. Said tremulor A pyramid of medulla oblongata and the supporter material connected with the base member of the tremulor concerned which touches said display panel or said display panel while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, Electronic equipment characterized by providing a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata.

[Claim 39] Said display panel is electronic equipment according to claim 38 characterized by being attached in the case of the electronic equipment concerned through said elastic member.

[Claim 40] Said display panel is electronic equipment according to claim 38 characterized by being attached in the main frame of the electronic equipment concerned through said elastic member.

[Claim 41] While supporting the display panel which the touch panel piled up, and said display panel When it is detected as the tremulor which gives vibration to said display panel that the touch actuation to said touch panel was received, the oscillating control means which generates vibration from said tremulor is provided. Said tremulor A pyramid of medulla oblongata, Electronic equipment characterized by providing the supporter material connected with the base member of the tremulor concerned which touches said display panel or said display panel, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air.

[Claim 42] Said display panel is electronic equipment according to claim 41 characterized by being attached in the case of the electronic equipment concerned through said tremulor.

[Claim 43] Said display panel is electronic equipment according to claim 41 characterized by being attached in the main frame of the electronic equipment concerned through said tremulor.

[Claim 44] Said tremulor is electronic equipment according to claim 38 or 41 characterized by making it reciprocate to said pyramid of medulla oblongata according to the movement force generated from said movement force generating means, and making said display panel produce vibration acceleration as reaction force of the reciprocating motion concerned, or giving the vibration acceleration produced in said base member as reaction force of said reciprocating motion to said display panel.

[Claim 45] Said supporter material is electronic equipment according to claim 38 or 41 characterized by being constituted using the elastic body, connecting one edge with said display panel or said base member, and connecting the other end with said

pyramid of medulla oblongata.

[Claim 46] Said tremulor is electronic equipment according to claim 38 or 41 characterized by vibrating said display panel in the direction which becomes perpendicular to the front face of the display panel concerned.

[Claim 47] Said oscillating control means is electronic equipment according to claim 38 or 41 characterized by generating vibration from the predetermined period for 1 or less second, and said tremulor after detecting that the touch actuation to said touch panel was received.

[Claim 48] Said oscillating control means is electronic equipment given in any 1 claim of claims 38, 41, and 47 characterized by impressing the driving signal which resonates this tremulor or said display panel to said tremulor when driving said tremulor and generating vibration.

[Claim 49] Electronic equipment characterized by providing the oscillating control means which generates vibration from said tremulor when it is detected as the tremulor which gives vibration to said touch panel that the touch actuation to said touch panel was received, while the display screen of a display and said display is prepared between a wrap touch panel, and said display and said touch panel and supporting said touch panel on said display screen.

[Claim 50] The display screen of a display and said display A wrap touch panel, The tremulor which is installed in said touch panel and gives vibration to the touch panel concerned, The oscillating absorption member which absorbs the oscillating component which is going to get across to said display among vibration which it was prepared between said displays and said touch panels, and was generated from said tremulor, Electronic equipment characterized by providing the oscillating control means which generates vibration from said tremulor when it is detected that the touch actuation to said touch panel was received.

[Claim 51] Said tremulor is electronic equipment according to claim 49 or 50 characterized by providing a pyramid of medulla oblongata, the supporter material connected with the base member of the tremulor concerned which touches said touch panel or said touch panel while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata.

[Claim 52] Said tremulor is electronic equipment according to claim 38 or 41 characterized by making it reciprocate to said pyramid of medulla oblongata according to the movement force generated from said movement force generating means, and making said touch panel produce vibration acceleration as reaction force of the reciprocating motion concerned, or giving the vibration acceleration produced in said base member as reaction force of said reciprocating motion to said touch panel.

[Claim 53] Said supporter material is electronic equipment according to claim 51 characterized by being constituted using the elastic body, connecting one edge with

said touch panel or said base member, and connecting the other end with said pyramid of medulla oblongata.

[Claim 54] Electronic equipment according to claim 50 characterized by using the elastic body for said oscillating absorption member.

[Claim 55] Said oscillating absorption member is electronic equipment according to claim 50 or 54 characterized by being prepared in the location which does not lap with said display screen.

[Claim 56] Said tremulor is electronic equipment according to claim 49 or 50 characterized by being prepared in the location which does not lap with said display screen.

[Claim 57] claim 49- characterized by said tremulor vibrating said touch panel in the direction which becomes perpendicular to the front face of the touch panel concerned -- electronic equipment given in any 1 claim of 52 and 56.

[Claim 58] Said oscillating control means is electronic equipment according to claim 49 or 50 characterized by generating vibration from the predetermined period for 1 or less second, and said tremulor after detecting that the touch actuation to said touch panel was received.

[Claim 59] Said oscillating control means is electronic equipment given in any 1 claim of claims 49, 50, and 58 characterized by impressing the driving signal which resonates this tremulor or said touch panel to said tremulor when driving said tremulor and generating vibration.

[Claim 60] Electronic equipment characterized by providing the control unit which receives an actuation input, the tremulor which the part is exposed and prepared outside from the case of the electronic equipment concerned at least, and gives an operator direct vibration, and the oscillating control means which generates vibration from said tremulor when it is detected that the actuation input to said control unit was received.

[Claim 61] The electronic equipment carry out providing the oscillating control means which generates vibration from said tremulor in the oscillatory-type voice which specified the class of the actuation input and was matched with the class of the actuation input concerned when it is detected as the control unit which receives an actuation input, and the tremulor which gives vibration to some cases of the different electronic equipment concerned from said control unit that the actuation input to said control unit was received as the description.

[Claim 62] Said control unit is electronic equipment according to claim 61 which is a touch panel and is characterized by generating vibration from said tremulor in the oscillatory-type voice which said oscillating control means detected the touch location of said touch actuation in said touch panel when it was detected that the touch actuation to said touch panel was received, and was matched with the touch location concerned.

[Claim 63] Said control unit is electronic equipment according to claim 61 characterized by generating vibration from said tremulor in the oscillatory-type voice which it has two or more handlers, and said oscillating control means specified the class of said handler operated when it was detected that the actuation input to said control unit was received, and was matched with the class of the handler concerned.
[Claim 64] Said oscillating control means is electronic equipment according to claim 61 characterized by generating vibration from said tremulor in the oscillatory-type voice which specified the class of command which the actuation input directs, and was matched with the class of the command concerned when it is detected that the actuation input to said control unit was received.
[Claim 65] The control unit which receives an actuation input, and the tremulor which gives vibration to some cases of the different electronic equipment concerned from said control unit, A modification means to change the parameter value for controlling the electronic equipment concerned according to the actuation input to said control unit, When it is detected that the actuation input which changes said parameter value to said control unit was received Electronic equipment characterized by providing the oscillating control means which generates vibration from said tremulor in the oscillatory-type voice matched with the parameter value changed by said modification means by the actuation input concerned.
[Claim 66] Said tremulor is electronic equipment according to claim 61 or 65 characterized by providing a pyramid of medulla oblongata, the supporter material connected with the base member of the tremulor concerned which touches said some of cases or said some of cases while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata.
[Claim 67] Said tremulor is electronic equipment according to claim 66 characterized by making it reciprocate to said pyramid of medulla oblongata according to the movement force generated from said movement force generating means, and making said some of cases produce vibration acceleration as reaction force of the reciprocating motion concerned, or giving the vibration acceleration produced in said base member as reaction force of said reciprocating motion to said some of cases.
[Claim 68] Said supporter material is electronic equipment according to claim 66 characterized by being constituted using the elastic body, connecting one edge with the part or said base member of said case, and connecting the other end with said pyramid of medulla oblongata.
[Claim 69] Said oscillating control means is electronic equipment given in any 1 claim of claims 61-65 characterized by impressing the driving signal which resonates some of these tremulor or said cases to said tremulor when driving said tremulor and generating vibration.

[Claim 70] The control unit which receives an actuation input, and the tremulor which gives vibration to said control unit, When it is detected that the actuation input to said control unit was received The class of the actuation input is specified and the oscillating control means which generates vibration from said tremulor in the oscillatory-type voice matched with the class of the actuation input concerned is provided. Said tremulor Electronic equipment characterized by providing a pyramid of medulla oblongata, the supporter material connected with the base member of the tremulor concerned which touches said control unit or said control unit while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata.

[Claim 71] Said control unit is electronic equipment according to claim 70 which is a touch panel and is characterized by generating vibration from said tremulor in the oscillatory-type voice which said oscillating control means detected the touch location of said touch actuation in said touch panel when it was detected that the touch actuation to said touch panel was received, and was matched with the touch location concerned.

[Claim 72] Said control unit is electronic equipment according to claim 70 characterized by generating vibration from said tremulor in the oscillatory-type voice which it has two or more handlers, and said oscillating control means specified the class of said handler operated when it was detected that the actuation input to said control unit was received, and was matched with the class of the handler concerned.

[Claim 73] Said oscillating control means is electronic equipment according to claim 70 characterized by generating vibration from said tremulor in the oscillatory-type voice which specified the class of command which the actuation input directs, and was matched with the class of the command concerned when it is detected that the actuation input to said control unit was received.

[Claim 74] The control unit which receives an actuation input, and the tremulor which gives vibration to said control unit, A modification means to change the parameter value for controlling the electronic equipment concerned according to the actuation input to said control unit, When it is detected that the actuation input which changes said parameter value to said control unit was received The oscillating control means which generates vibration from said tremulor in the oscillatory-type voice matched with the parameter value changed by said modification means by the actuation input concerned is provided. Said tremulor Electronic equipment characterized by providing a pyramid of medulla oblongata, the supporter material connected with the base member of the tremulor concerned which touches said control unit or said control unit while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata.

[Claim 75] Said tremulor is electronic equipment according to claim 70 or 74 characterized by making it reciprocate to said pyramid of medulla oblongata according to the movement force generated from said movement force generating means, and making said control unit produce vibration acceleration as reaction force of the reciprocating motion concerned, or giving the vibration acceleration produced in said base member as reaction force of said reciprocating motion to said control unit.

[Claim 76] Said supporter material is electronic equipment according to claim 70 or 74 characterized by being constituted using the elastic body, connecting one edge with said control unit or said base member, and connecting the other end with said pyramid of medulla oblongata.

[Claim 77] Said tremulor is electronic equipment given in any 1 claim of claims 70–74 characterized by vibrating said control unit to the contact direction of the operator at the time of the actuation input to said control unit, and its opposite direction.

[Claim 78] Said oscillating control means is electronic equipment given in any 1 claim of claims 70–74 characterized by generating vibration from the predetermined period for 1 or less second, and said tremulor after detecting that the actuation input to said control unit was received.

[Claim 79] claim 70– characterized by said oscillating control means impressing the driving signal which resonates this tremulor or said control unit to said tremulor when driving said tremulor and generating vibration –– electronic equipment given in any 1 claim of 74 and 78.

[Claim 80] The handler to which the parameter value for controlling the electronic equipment concerned is changed continuously, The tremulor which gives an operator vibration, and a modification means to change said parameter value based on the control input of said handler, Electronic equipment characterized by providing the oscillating control means which generates vibration from said tremulor in the oscillatory–type voice matched with the parameter value changed by said modification means by the actuation concerned when it is detected that actuation of said handler was received.

[Claim 81] The electronic equipment carry out providing the oscillating control means which generates vibration from said tremulor in the oscillatory–type voice matched with the press level of the actuation input concerned detected by said control unit when it is detected as the control unit which detects the press level of the actuation input concerned, and the tremulor which gives an operator vibration that the actuation input to said control unit was received, while receiving an actuation input as the description.

[Claim 82] Said control unit is electronic equipment according to claim 81 characterized by what is detected as press level which is different in that an operator's fingertip or actuation implement contacted the control unit concerned and said fingertip or the actuation implement having pressed the control unit concerned by

the force more than predetermined press level.

[Claim 83] Said control unit is electronic equipment according to claim 81 or 82 characterized by being a touch panel.

[Claim 84] Said control unit is electronic equipment according to claim 81 characterized by piling up the 1st touch panel which detects that an operator's fingertip or actuation implement contacted the control unit concerned, and is received as touch actuation, and the 2nd touch panel which detects that said fingertip or the actuation implement pressed the control unit concerned by the force more than predetermined press level, and is received as touch actuation.

[Claim 85] The electronic equipment carry out providing the information control means which reports to an operator the gap beforehand specified by the operator among said pronunciation means and said tremulor, or that the actuation input was received using the above on the other hand as the description when it is detected as the control unit which receives an actuation input, a pronunciation means give an operator an information sound, and the tremulor which give an operator vibration that the actuation input to said control unit was received.

[Claim 86] The control unit which receives an actuation input, and a pronunciation means to give an operator an information sound, The tremulor which gives an operator vibration, and a measurement means to measure the sound volume around the electronic equipment concerned, When it is detected that the actuation input to said control unit was received Electronic equipment characterized by being based on the measurement result by said measurement means among said pronunciation means and said tremulor, and providing the gap or information control means which reports to an operator that chose the above on the other hand and the actuation input was received using the selected thing concerned.

[Claim 87] Said information control means is electronic equipment according to claim 86 characterized by reporting to an operator that the actuation input was received using said tremulor at least when it is more than the sound volume to which the sound volume measured by said measurement means was beforehand set when it was detected that the actuation input to said control unit was received.

[Claim 88] The control unit which receives an actuation input, and a pronunciation means to give an operator an information sound, The tremulor which gives an operator vibration, and said pronunciation means from the base station which covers the area as for which the electronic equipment concerned is carrying out the ** area or said tremulor either A receiving means to receive the signal which specifies the above, When it is detected that the actuation input to said control unit was received Said pronunciation means specified by the signal received by said receiving means or said tremulor is electronic equipment characterized by providing the information control means which reports to an operator that the actuation input was received using the above either.

[Claim 89] The control unit which receives an actuation input, and a pronunciation means to give an operator an information sound, The tremulor which gives an operator vibration, and an acquisition means to acquire the positional information of the electronic equipment concerned, When it is detected that the actuation input to said control unit was received Electronic equipment characterized by being based on the positional information acquired by said acquisition means among said pronunciation means and said tremulor, and providing the gap or information control means which reports to an operator that chose the above on the other hand and the actuation input was received using the selected thing concerned.

[Claim 90] Said information control means is electronic equipment according to claim 89 characterized by reporting to an operator that the actuation input was received only using said tremulor when located in the area where the electronic equipment concerned was beforehand set up based on the positional information acquired by said acquisition means when it was detected that the actuation input to said control unit was received.

[Claim 91] Said tremulor is what one which constitutes the electronic equipment concerned of members is vibrated, and gives an operator vibration. The tremulor concerned A pyramid of medulla oblongata and the supporter material connected with the base member of the tremulor concerned which touches the vibrated member or said vibrated member of said electronic equipment while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, Electronic equipment given in any 1 claim of claims 80, 81, 85, 86, 88, and 89 characterized by providing a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata.

[Claim 92] Said tremulor is electronic equipment according to claim 91 characterized by making it reciprocate to said pyramid of medulla oblongata according to the movement force generated from said movement force generating means, and making said vibrated member produce vibration acceleration as reaction force of the reciprocating motion concerned, or giving the vibration acceleration produced in said base member as reaction force of said reciprocating motion to said vibrated member.

[Claim 93] Said supporter material is electronic equipment according to claim 91 characterized by being constituted using the elastic body, connecting one edge with said vibrated member or said base member, and connecting the other end with said pyramid of medulla oblongata.

[Claim 94] The control panel which receives touch actuation, and two or more tremulor which gives vibration to said control panel, When it is detected as a detection means to detect the touch location in said control panel that the touch actuation to said control panel was received Electronic equipment characterized by providing the oscillating control means which any one or more [of two or more of said tremulor] is chosen [control means] based on the touch location of said touch actuation

detected by said detection means, and generates vibration from the selected tremulor concerned.

[Claim 95] The control panel which receives touch actuation, and two or more tremulor which gives vibration to said control panel, When it is detected as a detection means to detect the touch location in said control panel that the touch actuation to said control panel was received, by the mutual intervention of the oscillatory wave which makes it generate from each of two or more of said tremulor So that the amplitude of vibration produced in the touch location of said touch actuation detected by said detection means may be amplified Electronic equipment characterized by providing a generation means to generate the driving signal which drives each of two or more of said tremulor, and the oscillating control means which each driving signal generated by said generation means is impressed [control means] to said corresponding tremulor, and generates vibration from each tremulor concerned.

[Claim 96] Said generation means is electronic equipment according to claim 95 characterized by to adjust the phase of the driving signal which drives each of two or more of said tremulor so that the amplitude of vibration produced in the touch location of said touch actuation detected by said detection means by the mutual intervention of the oscillatory wave which makes it generate from each of two or more of said tremulor may be amplified, when it is detected that the touch actuation to said control panel was received.

[Claim 97] Said generation means is electronic equipment according to claim 95 characterized by to generate the driving signal which drives each of two or more of said tremulor so that the amplitude of vibration produced in the touch location of said touch actuation detected by said detection means by the mutual intervention of the oscillatory wave which makes it generate from each of two or more of said tremulor may become the largest, when it is detected that the touch actuation to said control panel was received.

[Claim 98] The control panel with which the laminating of the deformable deformation layer was carried out by vibration, and two or more tremulor which gives vibration to said control panel, When it is detected as a detection means to detect the touch location in said control panel that the touch actuation to said control panel was received, by the mutual intervention of the oscillatory wave which makes it generate from each of two or more of said tremulor So that the thickness of said deformation layer of the touch location of said touch actuation detected by said detection means may become thinly or thick as compared with the time of un-touching Electronic equipment characterized by providing a generation means to generate the driving signal which drives each of two or more of said tremulor, and the oscillating control means which each driving signal generated by said generation means is impressed [control means] to said corresponding tremulor, and generates vibration from each tremulor concerned.

[Claim 99] Said deformation layer is electronic equipment according to claim 98 characterized by being constituted using either of the matter of the shape of a liquid, gel, and a particle.

[Claim 100] Said tremulor is electronic equipment given in any 1 claim of claims 94, 95, and 98 characterized by providing a pyramid of medulla oblongata, the supporter material connected with the base member of the tremulor concerned which touches said control panel or said control panel while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata.

[Claim 101] Said tremulor is electronic equipment according to claim 100 characterized by making it reciprocate to said pyramid of medulla oblongata according to the movement force generated from said movement force generating means, and making said control panel produce vibration acceleration as reaction force of the reciprocating motion concerned, or giving the vibration acceleration produced in said base member as reaction force of said reciprocating motion to said control panel.

[Claim 102] Said supporter material is electronic equipment according to claim 100 characterized by being constituted using the elastic body, connecting one edge with said control panel or said base member, and connecting the other end with said pyramid of medulla oblongata.

[Claim 103] Said tremulor is electronic equipment given in any 1 claim of claims 38, 41, 51, 66, 70, 74, 91, and 100 characterized by providing further the guide device of said pyramid of medulla oblongata for making a linear reciprocating motion perform to said pyramid of medulla oblongata.

[Claim 104] Said movement force generating means is electronic equipment given in any 1 claim of claims 38, 41, 51, 66, 70, 74, 91, and 100 characterized by generating magnetism as said movement force.

[Claim 105] Said movement force generating means is electronic equipment given in any 1 claim of claims 38, 41, 51, 66, 70, 74, 91, and 100 characterized by generating electrostatic force as said movement force.

[Claim 106] Said tremulor is electronic equipment given in any 1 claim of claims 38, 41, 51, 66, 70, 74, 91, and 100 characterized by providing further the resistance grant member which is made to perform a linear reciprocating motion to said pyramid of medulla oblongata, always contacts a side face parallel to the direction of the reciprocating motion of said pyramid of medulla oblongata which reciprocates, and gives contact resistance to said pyramid of medulla oblongata.

[Claim 107] Said tremulor is electronic equipment given in any 1 claim of claims 38, 41, 51, 66, 70, 74, 91, and 100 characterized by providing further a brake means to contact said pyramid of medulla oblongata and to stop the reciprocating motion of the pyramid of medulla oblongata concerned when generating of the movement force from said

movement force generating means stops.

[Claim 108] It is electronic equipment given in any 1 claim of claims 38, 41, 51, 66, 70, 74, 91, and 100 characterized by for said tremulor possessing the coil made to generate magnetism as said movement force generating means, and said electronic equipment possessing further the short-circuiting means which short-circuits the input edge of said coil when supply of a current is suspended to said coil.

[Claim 109] It is electronic equipment given in any 1 claim of claims 38, 41, 51, 66, 70, 74, 91, and 100 which said movement force generating means makes generate magnetism as said movement force, and are characterized by said tremulor having held said pyramid of medulla oblongata, said supporter material, and said movement force generating means in the space sealed in the case where it has the antimagnetic effectiveness.

[Claim 110] It is electronic equipment given in any 1 claim of claims 38, 41, 51, 66, 70, 74, 91, and 100 which said movement force generating means makes generate magnetism as said movement force, and are characterized by constituting said pyramid of medulla oblongata using a permanent magnet.

[Claim 111] While supporting a linear reciprocating motion possible, a pyramid of medulla oblongata and said pyramid of medulla oblongata in the air The supporter material connected with the base member of the tremulor concerned with which the tremulor concerned touches the vibrated body which gives vibration, or said vibrated body, A movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata, Tremulor characterized by providing the resistance grant member which always contacts a side face parallel to the direction of the reciprocating motion of said pyramid of medulla oblongata which performs a linear reciprocating motion according to the movement force generated from said movement force generating means, and gives contact resistance to said pyramid of medulla oblongata.

[Claim 112] Said resistance grant member is tremulor according to claim 111 characterized by surrounding all side faces parallel to the direction of the reciprocating motion of said pyramid of medulla oblongata.

[Claim 113] Said resistance grant member is tremulor according to claim 111 characterized by the thing which enclose all side faces parallel to the direction of the reciprocating motion of said pyramid of medulla oblongata, and which is established for more than one at equal intervals like.

[Claim 114] The supporter material connected with the base member of the tremulor concerned which touches a pyramid of medulla oblongata, and the vibrated body with which the tremulor concerned gives vibration while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air or said vibrated body, Tremulor characterized by providing a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata, and a brake

means to contact said pyramid of medulla oblongata and to stop the reciprocating motion of the pyramid of medulla oblongata concerned when generating of the movement force from said movement force generating means stops.

[Claim 115] Tremulor according to claim 114 characterized by providing further the guide device of said pyramid of medulla oblongata for making a linear reciprocating motion perform to said pyramid of medulla oblongata.

[Claim 116] Tremulor according to claim 111 or 114 characterized by making it reciprocate to said pyramid of medulla oblongata according to the movement force generated from said movement force generating means, and making said vibrated body produce vibration acceleration as reaction force of the reciprocating motion concerned, or giving the vibration acceleration produced in said base member as reaction force of said reciprocating motion to said vibrated body.

[Claim 117] Said supporter material is tremulor according to claim 111 or 114 characterized by being constituted using the elastic body, connecting one edge with said vibrated body or said base member, and connecting the other end with said pyramid of medulla oblongata.

[Claim 118] Said movement force generating means is tremulor according to claim 111 or 114 characterized by generating magnetism as said movement force.

[Claim 119] Said movement force generating means is tremulor according to claim 111 or 114 characterized by generating electrostatic force as said movement force.

[Claim 120] It is the tremulor according to claim 111 or 114 which said movement force generating means makes generate magnetism as said movement force, and is characterized by constituting said pyramid of medulla oblongata using a permanent magnet.

[Claim 121] The information approach by vibration characterized by generating vibration from the tremulor which was the information approach by the vibration in pocket mold electronic equipment, and is provided on this pocket mold electronic equipment when it is detected that the actuation input to a control unit was received, and vibrating the grasping section of the pocket mold electronic equipment concerned.

[Claim 122] Are the information approach by the vibration in pocket mold electronic equipment, and when it is detected that the actuation input to a control unit was received, drive the tremulor provided on this pocket mold electronic equipment, and it sets to the tremulor concerned. The information approach by vibration characterized by vibrating said control unit by making it reciprocate to the pyramid of medulla oblongata supported possible [a reciprocating motion] by the supporter material connected with the base member of the tremulor concerned which touches said control unit or said control unit in the air.

[Claim 123] The information approach by vibration characterized by generating vibration from the tremulor which was the information approach by the vibration in pocket mold electronic equipment, and is provided on this pocket mold electronic

equipment when it is detected that activation of the processing directed by the actuation input to a control unit was completed, and giving an operator vibration.

[Claim 124] When it is detected that are the information approach by the vibration in pocket mold electronic equipment, and the actuation input to a control unit was received The inside of the 2nd tremulor which gives vibration to the grasping section of the 1st tremulor which is provided on this pocket mold electronic equipment, and which gives vibration to said control unit, and the pocket mold electronic equipment concerned, The information approach by the gap beforehand specified by the operator, or vibration characterized by generating vibration from the above on the other hand, and giving an operator vibration.

[Claim 125] When it is detected that are the information approach by the vibration in pocket mold electronic equipment, and the actuation input to a control unit was received The inside of the 2nd tremulor which gives vibration to the grasping section of the 1st tremulor which is provided on this pocket mold electronic equipment, and which gives vibration to said control unit, and the pocket mold electronic equipment concerned, The information approach by vibration which has responded to the detection result of the sensor which detects whether the pocket mold electronic equipment concerned is grasped by the operator, and is characterized by choosing the above on the other hand in a gap, generating vibration from the selected tremulor concerned, and giving an operator vibration.

[Claim 126] The information approach by vibration characterized by to vibrate some cases of the electronic equipment concerned which is the information approach by the vibration in electronic equipment, specifies the class of that actuation input and make generate vibration in the oscillatory-type voice matched with the class of said actuation input from the tremulor provided on this electronic equipment when it is detected that the actuation input to a control unit was received, and is different from said control unit.

[Claim 127] Are the information approach by the vibration in electronic equipment, drive the tremulor which specified the class of that actuation input and is provided on this electronic equipment when it is detected that the actuation input to a control unit was received, and it sets to the tremulor concerned. The information approach by vibration characterized by vibrating said control unit by making it reciprocate to the pyramid of medulla oblongata supported possible [a reciprocating motion] by the supporter material connected with the base member of the tremulor concerned which touches said control unit or said control unit in the air.

[Claim 128] The information approach by vibration characterized by to be the information approach by the vibration in electronic equipment, to detect that touch location, to choose any one or more [of two or more tremulor which this electronic equipment possesses based on the touch location concerned] when it is detected that the touch actuation to a control panel was received, to generate vibration from

the selected tremulor concerned, and to give an operator vibration.

[Claim 129] When it is detected that are the information approach by the vibration in electronic equipment, and the touch actuation to a control panel was received So that that touch location may be detected and the amplitude of vibration produced in the touch location of said control panel by the mutual intervention of the oscillatory wave which makes it generate from each of two or more tremulor which this electronic equipment possesses may be amplified The information approach by vibration characterized by generating the driving signal impressed to each of two or more of said tremulor, driving each tremulor concerned, and giving an operator vibration.

[Claim 130] The gap which specifies by the operator beforehand among the tremulor which gives vibration to the pronunciation means and the operator who gives an information sound to the operator who possessed on this electronic equipment when it was detected that are the information control approach in electronic equipment, and the actuation input to a control unit was received, or the information control approach characterized by to report to an operator that an actuation input was received using the above on the other hand.

[Claim 131] When it is detected that are the information control approach in electronic equipment, and the actuation input to a control unit was received The inside of the tremulor which gives vibration to the pronunciation means and operator who possessed on this electronic equipment, and who give an operator an information sound, The information control approach which is based on the measurement result of a measurement means to measure the sound volume around the electronic equipment concerned, and is characterized by reporting to an operator that chose the above on the other hand in the gap, and the actuation input was received using the selected thing concerned.

[Claim 132] When it is detected that are the information control approach in electronic equipment, and the actuation input to a control unit was received The inside of the tremulor which gives vibration to the pronunciation means and operator who possessed on this electronic equipment, and who give an operator an information sound, either specified by the signal received from the base station which covers the area as for which the electronic equipment concerned is carrying out the ** area -- the information control approach characterized by reporting to an operator that the actuation input was received using the above.

[Claim 133] When it is detected that are the information control approach in electronic equipment, and the actuation input to a control unit was received The inside of the tremulor which gives vibration to the pronunciation means and operator who possessed on this electronic equipment, and who give an operator an information sound, The information control approach which is based on the positional information of the electronic equipment concerned, and is characterized by reporting to an operator that chose the above on the other hand in the gap, and the actuation input

was received using the selected thing concerned.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to pocket mold electronic equipment, electronic equipment, the tremulor, the information approach by vibration, and the information control approach, and relates to a detail at the user interface and oscillating developmental mechanics of electronic equipment.

[0002]

[Description of the Prior Art] Various electronic equipment, such as PDA (Personal Digital Assistant), and a personal computer, ATM (Automatic Tellers Machine: automatic teller's machine), has user interfaces, such as a manual operation button, and a keyboard, a touch panel. A user performs actuation inputs to electronic equipment, such as an input of an alphabetic character, and selection of processing to perform, through these user interfaces.

[0003]

[Problem(s) to be Solved by the Invention] However, it is deficient in the feeling of pushing at the time of, for example, a key and a manual operation button also pushing a key and a manual operation button with thin-shape[the miniaturization of pocket mold electronic equipment, lightweight-izing, and]-izing, in pocket mold electronic equipment equipped with the keyboard or the manual operation button, since it was thin-shape-ized, a miniaturization, lightweight-izing, and. For this reason, the user had to look at the contents of a display of a screen, and had to check whether depression actuation of a key and a manual operation button had been received by pocket mold electronic equipment.

[0004] Moreover, for example, in electronic equipment equipped with the touch panel, touch actuation with a fingertip or an attached pen is performed to a touch panel. Under the present circumstances, a way will be bad, or touch actuation will become an invalid, if contact of the fingertip and pen to a touch panel carries out and the degree of press is weak. For this reason, the contents of a display of a screen had to be seen too and the user had to check whether the touch actuation to a touch panel had been received by electronic equipment.

[0005] Moreover, although there was electronic equipment reported to a user about the actuation input having been received using the beep sound etc., the information by such sound was almost ineffective under the noise for example, in a town etc.

[0006] This invention is made in view of the situation explained above, and aims at

offering the pocket mold electronic equipment which can check easily the response of the electronic equipment to that the actuation input was received or an actuation input, without a user looking at a screen, electronic equipment, the tremulor, the information approach by vibration, and the information control approach.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, this invention provides the pocket mold electronic equipment possessing the oscillating control means which generates vibration from said tremulor, when it is detected as the control unit which receives an actuation input, and the tremulor which gives vibration to the grasping section of the pocket mold electronic equipment concerned that the actuation input to said control unit was received. Moreover, this invention is the information approach by the vibration in pocket mold electronic equipment, and when it is detected that the actuation input to a control unit was received, it offers the information approach by vibration which generates vibration from the tremulor provided on this pocket mold electronic equipment, and vibrates the grasping section of the pocket mold electronic equipment concerned.

[0008] According to this invention, it vibrates that the actuation input was received and pocket mold electronic equipment reports the grasping section of the pocket mold electronic equipment concerned for it to an operator.

[0009] Moreover, the control unit to which this invention receives an actuation input and tremulor which gives vibration to said control unit, When it is detected that the actuation input to said control unit was received, the oscillating control means which generates vibration from said tremulor is provided. Said tremulor The pocket mold electronic equipment possessing a pyramid of medulla oblongata, the supporter material connected with the base member of the tremulor concerned which touches said control unit or said control unit while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata is offered. Moreover, this invention is the information approach by the vibration in pocket mold electronic equipment, when it is detected that the actuation input to a control unit was received, drives the tremulor provided on this pocket mold electronic equipment, and sets it to the tremulor concerned. By making it reciprocate to the pyramid of medulla oblongata supported possible [a reciprocating motion] by the supporter material connected with the base member of the tremulor concerned which touches said control unit or said control unit in the air, the information approach by vibration which vibrates said control unit is offered.

[0010] According to this invention, it vibrates that the actuation input was received and pocket mold electronic equipment reports a control unit for it to an operator.

[0011] Moreover, this invention offers the pocket mold electronic equipment possessing the oscillating control means which generates vibration from said tremulor,

when it is detected that activation of the control unit which receives an actuation input, the tremulor which gives an operator vibration, and the processing directed by the actuation input to said control unit was completed. Moreover, the information approach by vibration which is made to generate vibration from the tremulor which this invention was the information approach by the vibration in pocket mold electronic equipment, and is provided on this pocket mold electronic equipment when it is detected that activation of the processing directed by the actuation input to a control unit was completed, and gives an operator vibration is provided.

[0012] According to this invention, vibration reports to an operator that activation of the processing directed by the actuation input ended pocket mold electronic equipment.

[0013] Moreover, the control unit to which this invention receives an actuation input and the 1st tremulor which gives vibration to said control unit, When it is detected as the 2nd tremulor which gives vibration to the grasping section of the pocket mold electronic equipment concerned that the actuation input to said control unit was received The pocket mold electronic equipment possessing the gap beforehand specified by the operator among said 1st tremulor and said 2nd tremulor or the oscillating control means which generates vibration from the above on the other hand is offered. Moreover, this invention is the information approach by the vibration in pocket mold electronic equipment. When it was detected that the actuation input to a control unit was received, provided on this pocket mold electronic equipment. The information approach by the gap beforehand specified by the operator among the 2nd tremulor which gives vibration to the grasping section of the 1st tremulor which gives vibration to said control unit, and the pocket mold electronic equipment concerned, or vibration which is made to generate vibration from the above on the other hand, and gives an operator vibration is offered.

[0014] According to this invention, pocket mold electronic equipment vibrates the part beforehand specified [that the actuation input was received and] by the operator, and is reported to an operator.

[0015] Moreover, the control unit to which this invention receives an actuation input and the 1st tremulor which gives vibration to said control unit, The 2nd tremulor which gives vibration to the grasping section of the pocket mold electronic equipment concerned, and a detection means to detect whether the pocket mold electronic equipment concerned is grasped by the operator, When it is detected that the actuation input to said control unit was received It has responded to the detection result by said detection means among said 1st tremulor and said 2nd tremulor, and the gap or pocket mold electronic equipment possessing the oscillating control means which the above is chosen [control means] on the other hand and generates vibration from the selected tremulor concerned is offered. Moreover, this invention is the information approach by the vibration in pocket mold electronic equipment. When

it was detected that the actuation input to a control unit was received, provided on this pocket mold electronic equipment. The inside of the 2nd tremulor which gives vibration to the grasping section of the 1st tremulor which gives vibration to said control unit, and the pocket mold electronic equipment concerned, It has responded to the detection result of the sensor which detects whether the pocket mold electronic equipment concerned is grasped by the operator, and a gap or the information approach by vibration which chooses the above on the other hand, is made to generate vibration from the selected tremulor concerned, and gives an operator vibration is offered.

[0016] According to this invention, pocket mold electronic equipment vibrates a part which is different in the actuation input having been received according to whether the pocket mold electronic equipment concerned is grasped by the operator, and is reported to an operator.

[0017] Moreover, the display panel to which the touch panel repeated this invention and tremulor installed in said display panel, The elastic member which supports said display panel possible [vibration] by vibration generated from said tremulor and which was constituted using the elastic body, When it is detected that the touch actuation to said touch panel was received, the oscillating control means which generates vibration from said tremulor is provided. Said tremulor A pyramid of medulla oblongata and the supporter material connected with the base member of the tremulor concerned which touches said display panel or said display panel while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, The electronic equipment possessing a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata is offered.

[0018] According to this invention, electronic equipment vibrates a touch panel the whole display panel, and reports to an operator that touch actuation was received.

[0019] Moreover, while this invention supports the display panel which the touch panel piled up, and said display panel When it is detected as the tremulor which gives vibration to said display panel that the touch actuation to said touch panel was received, the oscillating control means which generates vibration from said tremulor is provided. Said tremulor A pyramid of medulla oblongata, While supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, the electronic equipment possessing the supporter material connected with the base member of the tremulor concerned which touches said display panel or said display panel, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata is offered.

[0020] According to this invention, electronic equipment vibrates a touch panel the whole display panel, and reports to an operator that touch actuation was received.

[0021] Moreover, this invention offers the electronic equipment possessing the

oscillating control means which generates vibration from said tremulor, when it is detected as a display and the tremulor which gives vibration to said touch panel while the display screen of said display is prepared between a wrap touch panel, and said display and said touch panel and supporting said touch panel on said display screen that the touch actuation to said touch panel was received.

[0022] According to this invention, it vibrates that touch actuation was received and electronic equipment reports a touch panel for it to an operator.

[0023] This invention the display screen of a display and said display Moreover, a wrap touch panel, The tremulor which is installed in said touch panel and gives vibration to the touch panel concerned, The oscillating absorption member which absorbs the oscillating component which is going to get across to said display among vibration which it was prepared between said displays and said touch panels, and was generated from said tremulor, When it is detected that the touch actuation to said touch panel was received, the electronic equipment possessing the oscillating control means which generates vibration from said tremulor is offered.

[0024] According to this invention, it vibrates that touch actuation was received and electronic equipment reports only the touch panel on a display screen for it to an operator.

[0025] Moreover, this invention offers the electronic equipment possessing the oscillating control means which generates vibration from said tremulor, when it is detected as the control unit which receives an actuation input, and the tremulor which that part is exposed and prepared outside from the case of the electronic equipment concerned at least, and gives an operator direct vibration that the actuation input to said control unit was received.

[0026] According to this invention, from the tremulor, directly, electronic equipment gives an operator vibration and reports that touch actuation was received to him.

[0027] Moreover, when it is detected as the control unit which receives an actuation input, and the tremulor which gives vibration to some cases of the different electronic equipment concerned from said control unit that the actuation input to said control unit was received, this invention specifies the class of that actuation input, and provides the electronic equipment provide the oscillating control means which generates vibration from said tremulor in the oscillatory-type voice matched with the class of the actuation input concerned. Moreover, this invention is the information approach by the vibration in electronic equipment, when it is detected that the actuation input to a control unit was received, the class of that actuation input specifies, vibration generates in the oscillatory-type voice matched with the class of said actuation input from the tremulor provided on this electronic equipment, and the information approach by vibration which vibrates some cases of the different electronic equipment concerned from said control unit provides.

[0028] According to this invention, electronic equipment vibrates some cases which

are the oscillatory-type voice according to the class of the actuation input concerned, and are different from a control unit in the actuation input having been received, and is reported to an operator.

[0029] Moreover, the tremulor which gives vibration to some cases of the electronic equipment concerned by which this invention differs from the control unit which receives an actuation input, and said control unit, A modification means to change the parameter value for controlling the electronic equipment concerned according to the actuation input to said control unit, When it is detected that the actuation input which changes said parameter value to said control unit was received The electronic equipment possessing the oscillating control means which generates vibration from said tremulor in the oscillatory-type voice matched with the parameter value changed by said modification means by the actuation input concerned is offered.

[0030] According to this invention, electronic equipment is the oscillatory-type voice according to the parameter value after changing that the actuation input which changes parameter value was received, vibrates some different cases from a control unit, and is reported to an operator.

[0031] Moreover, the control unit to which this invention receives an actuation input and tremulor which gives vibration to said control unit, When it is detected that the actuation input to said control unit was received The class of the actuation input is specified and the oscillating control means which generates vibration from said tremulor in the oscillatory-type voice matched with the class of the actuation input concerned is provided. Said tremulor The electronic equipment possessing a pyramid of medulla oblongata, the supporter material connected with the base member of the tremulor concerned which touches said control unit or said control unit while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata is offered. Moreover, this invention is the information approach by the vibration in electronic equipment. When it is detected that the actuation input to a control unit was received, drive the tremulor which specified the class of that actuation input and is provided on this electronic equipment, and it sets to the tremulor concerned. By making it reciprocate to the pyramid of medulla oblongata supported possible [a reciprocating motion] by the supporter material connected with the base member of the tremulor concerned which touches said control unit or said control unit in the air, the information approach by vibration which vibrates said control unit is offered.

[0032] According to this invention, electronic equipment vibrates a control unit by the oscillatory-type [received / the actuation input] voice according to the class of the actuation input concerned, and is reported to an operator.

[0033] Moreover, the control unit to which this invention receives an actuation input and tremulor which gives vibration to said control unit, A modification means to

change the parameter value for controlling the electronic equipment concerned according to the actuation input to said control unit, When it is detected that the actuation input which changes said parameter value to said control unit was received The oscillating control means which generates vibration from said tremulor in the oscillatory-type voice matched with the parameter value changed by said modification means by the actuation input concerned is provided. Said tremulor The electronic equipment possessing a pyramid of medulla oblongata, the supporter material connected with the base member of the tremulor concerned which touches said control unit or said control unit while supporting said pyramid of medulla oblongata possible [a reciprocating motion] in the air, and a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata is offered.

[0034] According to this invention, electronic equipment vibrates a control unit by the oscillatory-type [received / the actuation input which changes parameter value] voice according to the parameter value after modification, and is reported to an operator.

[0035] Moreover, the handler to which parameter value for this invention to control the electronic equipment concerned is changed continuously, The tremulor which gives an operator vibration, and a modification means to change said parameter value based on the control input of said handler, When it is detected that actuation of said handler was received, the electronic equipment possessing the oscillating control means which generates vibration from said tremulor in the oscillatory-type voice matched with the parameter value changed by said modification means by the actuation concerned is offered.

[0036] According to this invention, electronic equipment reports to an operator that actuation of the handler to which parameter value is changed continuously was received by the oscillatory-type voice according to the parameter value after modification.

[0037] Moreover, while this invention receives an actuation input, when it is detected as the control unit which detects the press level of the actuation input concerned, and the tremulor which give an operator vibration that the actuation input to said control unit was received, it provides the electronic equipment provide the oscillating control means which generates vibration from said tremulor in the oscillatory-type voice matched with the press level of the actuation input concerned detected by said control unit.

[0038] According to this invention, electronic equipment reports to an operator that the actuation input was received by the oscillatory-type voice according to the press level of the actuation input concerned.

[0039] Moreover, this invention provides the gap which specifies by the operator beforehand among said pronunciation means and said tremulor, or the electronic

equipment provide the information control means reported [that the actuation input was received using the above on the other hand, and] to an operator, when it is detected as the control unit which receives an actuation input, a pronunciation means give an operator an information sound, and the tremulor which gives an operator vibration that the actuation input to said control unit was received. Moreover, the information control approach of reporting to an operator an actuation input having been received using the above on the other hand provides in the gap which specifies by the operator beforehand among the tremulor which gives vibration to the pronunciation means and the operator who possessed on this electronic equipment when it was detected that this invention is the information control approach in electronic equipment, and the actuation input to a control unit was received, and who gives an operator an information sound.

[0040] According to this invention, vibration or the sound beforehand specified [that the actuation input was received and] by the operator reports electronic equipment to an operator.

[0041] Moreover, the control unit to which this invention receives an actuation input and a pronunciation means to give an operator an information sound, The tremulor which gives an operator vibration, and a measurement means to measure the sound volume around the electronic equipment concerned, When it is detected that the actuation input to said control unit was received It is based on the measurement result by said measurement means among said pronunciation means and said tremulor, and the electronic equipment possessing the gap or information control means which reports to an operator that chose the above on the other hand and the actuation input was received using the selected thing concerned is offered. Moreover, when it is detected that this invention is the information control approach in electronic equipment, and the actuation input to a control unit was received The inside of the tremulor which gives vibration to the pronunciation means and operator who possessed on this electronic equipment, and who give an operator an information sound, It is based on the measurement result of a measurement means to measure the sound volume around the electronic equipment concerned, and the gap or information control approach which reports to an operator that chose the above on the other hand and the actuation input was received using the selected thing concerned is offered.

[0042] According to this invention, electronic equipment reports to an operator that the actuation input was received with vibration or a sound according to the sound volume around the electronic equipment concerned.

[0043] Moreover, the control unit to which this invention receives an actuation input and a pronunciation means to give an operator an information sound, The tremulor which gives an operator vibration, and said pronunciation means from the base station which covers the area as for which the electronic equipment concerned is carrying

out the ** area or said tremulor either A receiving means to receive the signal which specifies the above, When it is detected that the actuation input to said control unit was received either said pronunciation means specified by the signal received by said receiving means, or said tremulor -- the electronic equipment possessing the information control means which reports to an operator that the actuation input was received using the above is offered. Moreover, when it is detected that this invention is the information control approach in electronic equipment, and the actuation input to a control unit was received The inside of the tremulor which gives vibration to the pronunciation means and operator who possessed on this electronic equipment, and who give an operator an information sound, either specified by the signal received from the base station which covers the area as for which the electronic equipment concerned is carrying out the ** area -- the information control approach of reporting to an operator the actuation input having been received using the above means is offered.

[0044] According to this invention, according to the directions from the base station which covers the area where the electronic equipment concerned is carrying out the ** area of the actuation input having been received, vibration or a sound reports electronic equipment to an operator.

[0045] Moreover, the control unit to which this invention receives an actuation input and a pronunciation means to give an operator an information sound, The tremulor which gives an operator vibration, and an acquisition means to acquire the positional information of the electronic equipment concerned, When it is detected that the actuation input to said control unit was received It is based on the positional information acquired by said acquisition means among said pronunciation means and said tremulor, and the electronic equipment possessing the gap or information control means which reports to an operator that chose the above on the other hand and the actuation input was received using the selected thing concerned is offered. Moreover, when it is detected that this invention is the information control approach in electronic equipment, and the actuation input to a control unit was received The inside of the tremulor which gives vibration to the pronunciation means and operator who possessed on this electronic equipment, and who give an operator an information sound, It is based on the positional information of the electronic equipment concerned, and the gap or information control approach which reports to an operator that chose the above on the other hand and the actuation input was received using the selected thing concerned is offered.

[0046] According to this invention, electronic equipment reports to an operator that the actuation input was received with vibration or a sound according to the current position of the electronic equipment concerned.

[0047] Moreover, the control panel with which this invention receives touch actuation and two or more tremulor which gives vibration to said control panel, When it is

detected as a detection means to detect the touch location in said control panel that the touch actuation to said control panel was received Based on the touch location of said touch actuation detected by said detection means, any one or more [of two or more of said tremulor] is chosen, and the electronic equipment possessing the oscillating control means which generates vibration from the selected tremulor concerned is offered. Moreover, this invention is the information approach by the vibration in electronic equipment, when it is detected that the touch actuation to a control panel was received, that touch location detects, any one or more [of two or more tremulor which this electronic equipment possesses based on the touch location concerned] chooses, and the information approach by vibration which is made to generate vibration from the selected tremulor concerned, and gives an operator vibration provides.

[0048] According to this invention, electronic equipment changes the tremulor driven according to a touch location, when vibration reports to an operator that touch actuation was received.

[0049] Moreover, the control panel with which this invention receives touch actuation and two or more tremulor which gives vibration to said control panel, When it is detected as a detection means to detect the touch location in said control panel that the touch actuation to said control panel was received, by the mutual intervention of the oscillatory wave which makes it generate from each of two or more of said tremulor So that the amplitude of vibration produced in the touch location of said touch actuation detected by said detection means may be amplified The electronic equipment possessing a generation means to generate the driving signal which drives each of two or more of said tremulor, and the oscillating control means which each driving signal generated by said generation means is impressed [control means] to said corresponding tremulor, and generates vibration from each tremulor concerned is offered. Moreover, this invention is the information approach by the vibration in electronic equipment. When it is detected that the touch actuation to a control panel was received So that that touch location may be detected and the amplitude of vibration produced in the touch location of said control panel by the mutual intervention of the oscillatory wave which makes it generate from each of two or more tremulor which this electronic equipment possesses may be amplified The driving signal impressed to each of two or more of said tremulor is generated, each tremulor concerned is driven, and the information approach by vibration which gives an operator vibration is offered.

[0050] According to this invention, electronic equipment makes the amplitude of vibration produced in the touch location on a control panel amplify by the mutual intervention of the oscillatory wave which makes it generate from each tremulor, when generating vibration from two or more tremulor and reporting to an operator that touch actuation was received.

[0051] Moreover, the control panel with which, as for this invention, the laminating of the deformable deformation layer was carried out by vibration, Two or more tremulor which gives vibration to said control panel, and a detection means to detect the touch location in said control panel, When it is detected that the touch actuation to said control panel was received, by the mutual intervention of the oscillatory wave which makes it generate from each of two or more of said tremulor So that the thickness of said deformation layer of the touch location of said touch actuation detected by said detection means may become thinly or thick as compared with the time of un-touching The electronic equipment possessing a generation means to generate the driving signal which drives each of two or more of said tremulor, and the oscillating control means which each driving signal generated by said generation means is impressed [control means] to said corresponding tremulor, and generates vibration from each tremulor concerned is offered.

[0052] According to this invention, electronic equipment makes thickness of the deformation layer of the touch location on a control panel thinly or thick as compared with the time of un-touching by the mutual intervention of the oscillatory wave which makes it generate from each tremulor, when generating vibration from two or more tremulor and reporting to an operator that touch actuation was received.

[0053] Moreover, while supporting a linear reciprocating motion possible, this invention a pyramid of medulla oblongata and said pyramid of medulla oblongata in the air The supporter material connected with the base member of the tremulor concerned with which the tremulor concerned touches the vibrated body which gives vibration, or said vibrated body, A movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata, A side face parallel to the direction of the reciprocating motion of said pyramid of medulla oblongata which performs a linear reciprocating motion according to the movement force generated from said movement force generating means is always contacted, and the tremulor possessing the resistance grant member which gives contact resistance to said pyramid of medulla oblongata is offered.

[0054] According to this invention, when generating of the movement force from a movement force generating means stops, the reciprocating motion of a pyramid of medulla oblongata stops promptly by contact resistance.

[0055] Moreover, while this invention supports a pyramid of medulla oblongata and said pyramid of medulla oblongata possible [a reciprocating motion] in the air The supporter material connected with the base member of the tremulor concerned with which the tremulor concerned touches the vibrated body which gives vibration, or said vibrated body, The tremulor possessing a movement force generating means to give the movement force for making it reciprocate to said pyramid of medulla oblongata, and a brake means to contact said pyramid of medulla oblongata and to stop the reciprocating motion of the pyramid of medulla oblongata concerned when generating

of the movement force from said movement force generating means stops is offered.
[0056] According to this invention, when generating of the movement force from a movement force generating means stops, a brake means stops the reciprocating motion of a pyramid of medulla oblongata immediately.
[0057]
[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained. The gestalt of this operation cannot show one mode of this invention, cannot limit this invention, and can change it into arbitration in the range of this invention.
[0058] [A. 1st operation gestalt]
[Configuration of A-1. 1st operation gestalt] drawing 1 is a perspective view which illustrates the appearance of PDA10 concerning the 1st operation gestalt of this invention. In this drawing, the touch panel 102 of transparence has piled up on the display screen of liquid crystal display panel 103a which attends opening of the body case 101. A user inputs the operator command to PDA10 by touching this touch panel 102 by the fingertip. In addition, the touch actuation to a touch panel 102 may be a gestalt which uses actuation implements, such as a pen. Moreover, the actuation keys 104a, 104b, and 104c of the depression type for inputting operator command into PDA10, such as ON/OFF actuation of a main power supply, are formed in the top face of the body case 101.
[0059] Next, drawing 2 is a block diagram which illustrates the hardware configuration of PDA10 shown in drawing 1 . As shown in this drawing, PDA10 has a touch panel 102, a display 103, the key input section 111, memory 112, CPU (Central Processing Unit)113, the driving signal generation circuit 114, and the oscillating actuator 115.
[0060] A touch panel 102 outputs the signal (it is hereafter described as a touch signal) which shows the touch location on a touch panel 102 according to touch actuation to CPU113. Moreover, a display 103 has liquid crystal display panel 103a and the drive circuit which performs the display control of this liquid crystal display panel 103a. The key input section 111 outputs the key stroke signal according to depression actuation of the actuation keys 104a-104c by the user to CPU113. A program, data, etc. for controlling PDA10 are stored in memory 112. Moreover, the data point of the driving signal for driving the oscillating actuator 115 is stored in this memory 112.
[0061] CPU113 controls each part of equipment connected through the bus 116 by performing the program stored in memory 112. When oscillating control processing 1 (refer to drawing 5) is performed and the actuation input from a touch panel 102 or the actuation keys 104a-104c is detected, this CPU113 drives the oscillating actuator 115 through the driving signal generation circuit 114, and vibrates a touch panel 102 and the actuation keys 104a-104c.
[0062] The driving signal generation circuit 114 generates the driving signal for driving the oscillating actuator 115 according to the data point supplied from CPU113.

Moreover, this driving signal generation circuit 114 impresses a driving signal to the oscillating actuator 115 according to the directions from CPU113.

[0063] The oscillating actuator 115 is the so-called linear oscillating actuator (Linear Oscillatory Actuator) of the permanent magnet ejector half which the permanent magnet is used [ejector half] as a movable spindle (pyramid of medulla oblongata), makes electromagnetic force perform a linear reciprocating motion to a movable spindle, and generates vibration. This oscillating actuator 115 is driven with the driving signal impressed from the driving signal generation circuit 114, and generates vibration.

[0064] Drawing 3 is a sectional view which illustrates typically the installation condition of the oscillating actuator 115 within the body case 101 of PDA10. As shown in this drawing, the case 115a top face of the oscillating actuator 115 is in contact with liquid crystal display panel 103a and the actuation keys 104a-104c. Moreover, the spring 123 and ** which support the movable spindle 122 of the shape of the coil 121 of the shape of a cylinder fixed to the case 115a top face and a cylinder which was formed with the permanent magnet, and which has a clearance between the shape of a circular ring in which a coil 121 is settled, and the movable spindle 122 are prepared in the interior of case 115a of the oscillating actuator 115.

[0065] In addition, case 115a of the oscillating actuator 115 is sealed, and functions as magnetic shielding. What is necessary is just to form forming for example, case 115a by the conductive matter, and considering as touch-down or same electric potential, or case 115a with the magnetic substance with large permeability, in order to give the function as such magnetic shielding to case 115a.

[0066] The movable spindle 122 is in the condition in which a reciprocating motion linear in the vertical direction is possible among drawing, and is supported with the spring 123 by the space formed in the interior of case 115a of the oscillating actuator 115. As this spring 123 is shown in drawing 3 , one edge is tied to case 115a (base member) which touches liquid crystal display panel 103a and the actuation keys 104a-104c, and the other end is tied to the movable spindle 122. In addition, a spring 123 may be a configuration prepared. [two or more] Moreover, the rubber of the shape for example, of a string etc. may use the supporter material constituted by using an elastic body instead of a spring 123.

[0067] The movable spindle 122 will perform a linear reciprocating motion in the vertical direction among drawing by the magnetism generated from this coil 121, if alternating current (driving signal) is impressed to a coil 121. As reaction force of a reciprocating motion of this movable spindle 122, vibration acceleration arises into the case 115a part to which the spring 123 was tied. In addition, although the oscillating component transmitted from the movable spindle 122 through a spring 123 joins the case 115a part to which the spring 123 was tied besides the reaction force of this reciprocating motion with the reciprocating motion of the movable spindle 122, the base of the oscillating generating principle in this oscillating actuator 115 is to use the

vibration acceleration produced as reaction force of a reciprocating motion of the movable spindle 122.

[0068] Vibration gets across to liquid crystal display panel 103a and the actuation keys 104a-104c by this vibration acceleration. The direction of this vibration is a direction which becomes perpendicular to the front face of a touch panel 102, and is in agreement with the direction where a user presses a touch panel 102 and the actuation keys 104a-104c, and its opposite direction. This vibrates in the direction in which a touch panel 102 and the actuation keys 104a-104c become perpendicular to the front face of a touch panel 102, and vibration gets across to the fingertip of the user who is performing the actuation input.

[0069] In addition, although the oscillating actuator 115 shown in drawing 3 is sealed by case 115a which has the antimagnetic effectiveness, it does not need to be sealed by such case 115a. Moreover, the spring 123 which supports the movable spindle 112 may be connected with the rear face of the liquid crystal display panel 103 etc. not case 115a but directly.

[0070] By the way, there are the following advantages in using the oscillating actuator 115 formed into 1 package in this way. That is, when using the oscillating actuator which is not formed into 1 package, separation installation of the member of an oscillating actuator must be carried out to the both sides of the rear face of the liquid crystal display panel which the touch panel piled up, and the main frame of the electronic equipment which supports this liquid crystal display panel. For example, while installing a permanent magnet in the rear face of a liquid crystal display panel, it is necessary to install a coil in the location which counters the main frame side of electronic equipment with a permanent magnet.

[0071] In such a case, if the installation precision of the member which carried out separation installation is bad, or if the installation precision of a member gets worse according to secular change, it is difficult for this to surface as fault of vibration of a touch panel immediately, and to vibrate a touch panel in a stable precision. Moreover, the process of the assembly activity of electronic equipment will make complicated alignment of a things, a permanent magnet, and a coil with many components mark etc., and product cost will attach only the part highly.

[0072] Furthermore, when performing such ******, in order to vibrate a touch panel efficiently, base materials which support a liquid crystal display panel, such as the main frame of electronic equipment and a case, are certainly being fixed, or the mass of a base material must fully be large to a liquid crystal display panel. Therefore, separation installation of an oscillating actuator is suitable for neither lightweight electronic equipment nor pocket mold electronic equipment.

[0073] On the other hand, since the movable spindle 122 (permanent magnet) and the coil 121 are beforehand held in case 115a when the oscillating actuator 115 formed into 1 package is used, the right and wrong of the installation precision of a permanent

magnet and a coil hardly arise. Moreover, as compared with the case where separation installation is performed, it is hard to produce aggravation of the installation precision of the permanent magnet by secular change, and a coil. Therefore, a touch panel 102 can be vibrated in a stable precision. Moreover, the process of the assembly activity of electronic equipment can be simplified that what is necessary is just to attach the oscillating actuator 115 formed into 1 package to members which want to vibrate, such as a rear face of liquid crystal display panel 103a.

[0074] Furthermore, the oscillating actuator 115 gives vibration produced as reaction force of the reciprocating motion concerned to liquid crystal display panel 103a with which the movable spindle 122 is connected by making it reciprocate to the movable spindle 122 supported in the air. Therefore, even if the case where base materials, such as the main frame of PDA10 and the body case 101, are not certainly being fixed, and the mass of a base material are the cases which are not large enough to liquid crystal display panel 103a, the oscillating actuator 115 can give vibration of sufficient magnitude to liquid crystal display panel 103a etc. This is suitable when it uses for lightweight electronic equipment or the electronic equipment of a pocket mold especially.

[0075] In addition, if the sound signal of an audible band is impressed to the coil 121 of this oscillating actuator 115, for example, case 115a of the oscillating actuator 115, the body case 101 of PDA10 where the oscillating actuator 115 concerned was installed, etc. can be vibrated, and the sound according to a sound signal can be generated. That is, the oscillating actuator 115 can be used also as a source of pronunciation. In this case, for example, vibration generated from the oscillating actuator 115 according to impression of a sound signal is transmitted, it is suitable to consider as the configuration which makes the loudness level which made it generate from the oscillating actuator 115 amplify, using liquid crystal display panel 103a, the body case 101, etc. as a sound sound-reinforcement device. Thus, if the tremulor and the source of pronunciation can be made to serve a double purpose, for example in small electronic equipment, such as a portable telephone and a pager, the installation tooth space of a component part can be saved sharply. In addition, when giving the function as a source of pronunciation to the oscillating actuator 115, it is good for the interior or the exterior of the oscillating actuator 115 also as a configuration possessing sound sound-reinforcement devices, such as for example, cone paper and a horn.

[0076] Next, drawing 4 is drawing which illustrates the wave of the driving signal impressed to the oscillating actuator 115. In this drawing, the frequency f0 of the driving signal impressed to the coil 121 of the oscillating actuator 115 is made in agreement with the natural frequency f1 of the body case 101 of PDA10, or the natural frequency f2 of oscillating actuator 115 self. If the driving signal of such a frequency f0 is impressed to a coil 121, since the body case 101 or the oscillating

actuator 115 of PDA10 will resonate, a bigger vibration can be given to a user with little drive power. That is, the power consumption of PDA10 can be cut down. Such frequency data, amplitude data, etc. are stored in memory 112 as a data point of a driving signal.

[0077] In addition, it may be determined that the value of the frequency f0 of a driving signal which carried out the integral multiple of this frequency f0 corresponds with a resonant frequency f1 or a resonant frequency f2. Even if it is such a frequency f0, the body case 101 or the oscillating actuator 115 of PDA10 can be resonated. Moreover, the wave of a driving signal is not limited to the SIN wave illustrated to drawing 4 , and it is needless to say that you may be a square wave, a trapezoidal wave, a triangular wave, etc.

[0078] [Actuation of A-2. 1st operation gestalt] drawing 5 is a flow chart explaining actuation of the oscillating control processing 1 performed by CPU113 in PDA10 concerning this operation gestalt. This oscillating control processing 1 is performed for every predetermined period by CPU113 in the period when the actuation input to a touch panel 102 or the actuation keys 104a-104c is permitted.

[0079] As shown in this drawing, CPU113 distinguishes first whether the key stroke signal was inputted from whether the touch signal was inputted from the touch panel 102, and the key input section 111 (step S101). Both CPUs113 end the oscillating control processing 1, when the touch signal and the key stroke signal were not inputted and it distinguishes. on the other hand -- CPU113 -- either a touch signal or a key stroke signal -- when it distinguishes that the above was inputted, the data point of the driving signal impressed to the oscillating actuator 115 is first read from memory 112 (step S102).

[0080] In addition, in the above-mentioned step S101, even if CPU113 is the case where it distinguishes that the touch signal was inputted from a touch panel 102, when the touch location on the touch panel 102 based on this signal detects it as having separated from the viewing area of the touch carbon button currently displayed on the display screen, it does not shift to processing of step S102, but ends the oscillating control processing 1.

[0081] Subsequently, CPU113 outputs the data point read from memory 112 to the driving signal generation circuit 114. Moreover, CPU113 directs generation of a driving signal to this and coincidence to the driving signal generation circuit 114 (step S103). By processing of this step S103, the driving signal generation circuit 114 generates a driving signal using the data point supplied from CPU113.

[0082] Subsequently, CPU113 resets the counted value for clocking the impression time amount of a driving signal (step S104). And CPU113 directs impression initiation of a driving signal to the driving signal generation circuit 114 (step S105). Moreover, CPU113 starts the time check of impression time amount to this and coincidence (step S106). The driving signal generation circuit 114 will impress a period until an

impression halt is directed from CPU113 after this, and a driving signal to the oscillating actuator 115, if impression initiation is directed from CPU113. Thereby, the oscillating actuator 115 drives and it vibrates in the direction in which a touch panel 102 and the actuation keys 104a-104c become perpendicular to the front face of a touch panel 102.

[0083] moreover, CPU113 -- the time check of impression time amount -- according to initiation, the counted value for the time of an impression hour meter is counted up (step S107). And CPU113 distinguishes whether the counted value equivalent to the convention time amount to which counted value was set beforehand was reached (step S108). For example, in this operation gestalt, convention time amount is set to 0.5 seconds.

[0084] When impression time amount is below convention time amount, CPU113 returns to the above-mentioned step S107, and counts up impression time amount. Moreover, CPU113 directs an impression halt of a driving signal to the driving signal generation circuit 114, when it distinguishes that impression time amount exceeded convention time amount (i.e., when impression time amount reaches at 0.5 seconds) (step S109). Then, CPU113 ends the oscillating control processing 1. The driving signal generation circuit 114 will stop impression of the driving signal to the oscillating actuator 115, if an impression halt is directed from CPU113.

[0085] According to this operation gestalt, as explained above, when the actuation input to a touch panel 102 or the actuation keys 104a-104c is detected, CPU113 drives the oscillating actuator 115 and vibrates a touch panel 102 and the actuation keys 104a-104c. Therefore, PDA10 can report by vibration that the actuation input was received to a user. Consequently, even if a user does not look at a screen display, he can check whether the actuation input to a touch panel 102 or the actuation keys 104a-104c has been received by PDA10.

[0086] Moreover, since the linear oscillating actuator is used as an oscillating actuator 115, the direction precision of vibration generated from this oscillating actuator 115 is high. Therefore, when touch actuation was performed to the touch panel 102 by building the oscillating actuator 115 into PDA10 so that it may become perpendicular to the direction of a depression of the front face of a touch panel 102, or the actuation keys 104a-104c about the oscillating direction, or when depression actuation of the thin actuation keys 104a-104c is performed, the feeling of pushing of a touch carbon button or an actuation key can be given to a user by oscillating stimulus.

[0087] Moreover, this oscillating actuator 115 can be used also as a source of pronunciation by impressing the sound signal of an audible band to the coil 121 of the oscillating actuator 115.

[0088] Furthermore, when a touch panel 102 and the actuation keys 104a-104c are operated by making vibration periods into short time, such as 0.5 etc. seconds, the same actuation feeling as the so-called feeling of a click can be given to a user by

oscillating stimulus. Here, in case a feeling of a click operates a mouse and chooses the icon and carbon button by which a screen display is carried out to the display, it is actuation feeling produced when actuation which pushes in and detaches the carbon button of a mouse is performed. In order to give such a feeling of a click, it is desirable that vibration periods are 1 or less second at the maximum. Moreover, by making vibration periods into a short time in this way, the drive power of the oscillating actuator 115 can be reduced and the power consumption of PDA10 can be saved.

[0089] Moreover, the oscillating actuator 115 has held the coil 121 and the movable spindle 122 in case 115a sealed as magnetic shielding. Therefore, the oscillating actuator 115 is not influenced by the component part of PDA10 installed in the perimeter of magnetism. Moreover, the oscillating actuator 115 does not have effect of the magnetism generated from a coil 121 to a surrounding component part.

[0090] The oscillating actuator 115 is important for making it not influenced by the surrounding component part of magnetism in the point which keeps constant the direction precision of a reciprocating motion of the movable spindle 122, i.e., the direction precision of vibration generated from the oscillating actuator 115. If the direction of vibration generated from the oscillating actuator 115 under the effect of the magnetism from a surrounding component part shifts, it will become impossible because, to give a user the feeling of pushing of a touch carbon button or an actuation key mentioned above by oscillating stimulus.

[0091] Moreover, the oscillating actuator 115 is important for making it not have effect of magnetism to the component part of the perimeter in the point which prevents malfunction of a surrounding component part. This operation gestalt explained the case where liquid crystal display panel 103a was used. However, if the oscillating actuator which does not have the antimagnetic effectiveness near the CRT is installed in order to vibrate a touch panel 102 when using CRT (Cathode-Ray Tube) instead of liquid crystal display panel 103a, discoloration, distortion, etc. may arise by the contents of a display of CRT under the effect of the magnetism generated from this oscillating actuator.

[0092] In addition, in this operation gestalt, the case where vibration was given to the fingertip of the user who performed the configuration which vibrates control units, such as a touch panel 102 and the actuation keys 104a-104c, i.e., an actuation input, was explained. However, you may make it give vibration to the hand of the user instead of the configuration which vibrates the body case 101 of PDA10, i.e., the fingertip which performed the actuation input, who grasps PDA10.

[0093] [-- B. -- the 2nd -- an operation gestalt] book operation gestalt explains the case where the vibrator which used the DC motor is used as tremulor. In addition, in this operation gestalt, the same sign shall be used about the part which is common in the above-mentioned 1st operation gestalt. Moreover, the explanation shall be omitted about the part which is common in the 1st operation gestalt.

[0094] [Configuration of B-1. 2nd operation gestalt] drawing 6 is a block diagram which illustrates the hardware configuration of PDA20 concerning this operation gestalt. As shown in this drawing, PDA20 has a touch panel 102, a display 103, the key input section 111, memory 112, CPU113, the driving signal generation circuit 211, vibrator 212, and an encoder 213.

[0095] The data point of the driver voltage for driving vibrator 212 is stored in memory 112. When oscillating control processing 2 (refer to drawing 11) is performed and the actuation input from a touch panel 102 or the actuation keys 104a-104c is detected, CPU113 drives vibrator 212 through the driving signal generation circuit 211, and vibrates a touch panel 102 and the actuation keys 104a-104c. Moreover, CPU113 determines the impression halt timing of a driving signal to vibrator 212 based on the angle-of-rotation information supplied from an encoder 213.

[0096] The driving signal generation circuit 211 generates the driving signal for driving vibrator 212 according to the data point supplied from CPU113. Moreover, this driving signal generation circuit 211 impresses a driving signal to vibrator 212 according to the directions from CPU113. Moreover, vibrator 212 is the DC motor which attached the eccentric spindle in the revolving shaft. This vibrator 212 is driven with the driving signal impressed from the driving signal generation circuit 211, and generates vibration.

[0097] Drawing 7 is a sectional view which illustrates typically the installation condition of the vibrator 212 within the body case 101 of PDA20. Moreover, drawing 8 is a perspective view which illustrates the appearance of vibrator 212. As shown in drawing 7 , the vibrator 212 held in case 212a is installed in the inferior surface of tongue of liquid crystal display panel 103a. This vibrator 212 is being fixed in case 212a by the supporter material which omitted illustration. Moreover, vibrator 212 is constituted by DC motor 223 which attached the eccentric spindle 222 at the tip of a revolving shaft 221 as shown in drawing 7 and drawing 8 .

[0098] If driver voltage (driving signal) is impressed to this DC motor 223, the eccentric spindle 222 attached in the revolving shaft 221 will rotate, and vibration will occur in case 212a in rotation of this eccentric spindle 222. In addition, when vibrator 212 is used, unlike the case of the oscillating actuator 115 explained in the above-mentioned 1st operation gestalt, the direction and its oscillatory-type voice of vibration generated from vibrator 212 will differ from each other in the initial valve position of the eccentric spindle 222, the hand of cut of DC motor 223, etc. In order to generate the same vibration from vibrator 212 each time, it is necessary to detect the location of the eccentric spindle 222 and to always rotate the eccentric spindle 222 in this direction from the same location.

[0099] For this reason, the encoder 213 possesses in PDA20 which starts this operation gestalt as shown in drawing 6 . This encoder 213 detects the angle-of-rotation information on DC motor 223, and outputs it to CPU113. CPU113 determines the impression halt timing of the driver voltage to DC motor 223 based on

the angle-of-rotation information supplied from an encoder 213. For example, with this operation gestalt, as shown in drawing 7 , when it centers on a revolving shaft 221, the impression halt timing of the driver voltage to DC motor 223 is determined so that the eccentric spindle 222 may stop exactly in the location at 12:00. In addition, when a stepping motor is used instead of DC motor 223, it is possible to detect the location of the eccentric spindle attached in the revolving shaft, without using an encoder 213.

[0100] The direction of vibration generated from vibrator 212 can be made in agreement with the direction which becomes perpendicular to the front face of a touch panel 102 by controlling the halt location of the eccentric spindle 222, as explained above. Vibration generated from vibrator 212 gets across to a touch panel 102 through liquid crystal display panel 103a. This vibrates in the direction in which a touch panel 102 becomes perpendicular to that front face, and this vibration gets across to the fingertip of the user who is operating the touch panel 102.

[0101] Next, drawing 9 is drawing illustrated about the wave of the driver voltage impressed to vibrator 212. Moreover, drawing 10 is drawing illustrated about vibration produced on the front face of a touch panel 102. In the case of vibrator 212, the rotational frequency of DC motor 223 changes according to the driver voltage impressed. Here, if the engine speed of DC motor 223 is in agreement with the natural frequency f1 of the body case 101 of PDA20, or the natural frequency f3 of vibrator 212, the body case 101 or vibrator 212 of PDA20 will resonate.

[0102] So, with this operation gestalt, the driver voltage which makes the engine speed of DC motor 223 in agreement with a natural frequency f1 or a natural frequency f3 is impressed to vibrator 212. Therefore, as shown in drawing 10 , a touch panel 102 vibrates in the direction which becomes perpendicular to the front face with the period of a resonant frequency f1 or a resonant frequency f3. In this, little drive power enables it to give a bigger vibration, and the power consumption of PDA20 can be cut down. In addition, the wave of driver voltage is not limited to the square wave illustrated to drawing 9 .

[0103] [Actuation of B-2. 2nd operation gestalt] drawing 11 is a flow chart explaining actuation of the oscillating control processing 2 performed by CPU113 in PDA20 concerning this operation gestalt. This oscillating control processing 2 is performed for every predetermined period by CPU113 in the period when the actuation input to a touch panel 102 or the actuation keys 104a-104c is permitted. In addition, since the processing shown in steps S201-S208 of this oscillating control processing 2 is the same as processing of steps S101-S108 of the oscillating control processing 1 (refer to drawing 5) explained with the above-mentioned 1st operation gestalt, explanation is omitted.

[0104] However, in this operation gestalt, since vibrator 212 is used as tremulor, the driving signal generated in the driving signal generation circuit 211 serves as driver voltage shown in drawing 9 . Vibrator 212 will rotate DC motor 223 at the rotational

frequency which is in agreement with the natural frequency f1 of the body case 101, or the natural frequency f3 of vibrator 212, if this driver voltage is impressed. The eccentric spindle 222 rotates by this and vibration is generated. By vibration generated from this vibrator 212, it vibrates in the direction in which a touch panel 102 and the actuation keys 104a-104c become perpendicular to the front face of a touch panel 102.

[0105] And when impression time amount distinguishes CPU113 as having exceeded convention time amount in step S208 (i.e., when impression time amount reaches at 0.5 seconds), it shifts to step S209. Subsequently, CPU113 determines the impression halt timing of the driver voltage for stopping the eccentric spindle 222 in the location same each time based on the angle-of-rotation information supplied from an encoder 213 (step S209). With this operation gestalt, as shown in drawing 7 , when it centers on a revolving shaft 221, the impression halt timing of driver voltage is determined that the eccentric spindle 222 will stop exactly in the location at 12:00.

[0106] Subsequently, CPU113 directs an impression halt of a driving signal to the driving signal generation circuit 211 according to the determined impression halt timing (step S210). Then, CPU113 ends the oscillating control processing 2. The driving signal generation circuit 211 will stop impression of the driving signal to vibrator 212, if an impression halt is directed from CPU113. The eccentric spindle 222 attached in DC motor 223 of vibrator 212 by this stops in the same location each time. Thus, the direction of vibration generated from vibrator 212 is fixable by always stopping the eccentric spindle 222 in the same location, and rotating this eccentric spindle 222 in this direction from the same halt location. moreover, vibration generated from vibrator 212 -- more -- the grain -- it becomes possible to control densely.

[0107] According to this operation gestalt, as explained above, when the actuation input to a touch panel 102 or the actuation keys 104a-104c is detected, CPU113 drives vibrator 212 and vibrates a touch panel 102 and the actuation keys 104a-104c. Therefore, PDA20 can report by vibration that the actuation input was received to a user.

[0108] Moreover, the eccentric spindle 222 is always stopped in the same location, and it was made to make rotation start in this direction from the halt location concerned with this operation gestalt. vibration generated from vibrator 212 while the direction of vibration generated from vibrator 212 is fixable by this -- more -- the grain -- it is densely controllable. Since it is above, when touch actuation was performed to the touch panel 102, or when depression actuation of the thin actuation keys 104a-104c is performed, the feeling of pushing of a touch carbon button or an actuation key and a feeling of a click can be given to a user by oscillating stimulus. Grant of such a feeling of pushing and a feeling of a click is being unable to attain, if the halt location of the eccentric spindle 222 mentioned above is not controlled, and is

were unrealizable by the conventional motor with an eccentric spindle.

[0109] [-- C. -- the 3rd -- with an operation gestalt] book operation gestalt, when activation of the processing directed by the actuation input is completed, the pocket mold electronic equipment which reports activation termination of this processing by vibration is explained. In addition, in this operation gestalt, the same sign shall be used about the part which is common in the above-mentioned 1st operation gestalt. Moreover, the explanation shall be omitted about the part which is common in the 1st operation gestalt.

[0110] [Configuration of C-1. 3rd operation gestalt] drawing 12 is a perspective view which illustrates the appearance of PDA30 concerning this operation gestalt. In this drawing, opening of the body case 301 is attended and the display screen of liquid crystal display panel 302a is established in PDA30. Moreover, the key input section 303 which has two or more actuation keys of a depression type is formed in the top face of the body case 301.

[0111] Drawing 13 is a block diagram which illustrates the hardware configuration of PDA30 shown in drawing 12 . As shown in this drawing, PDA30 has a display 302, the key input section 303, the Radio Communications Department 304, memory 112, CPU113, the driving signal generation circuit 114, and the oscillating actuator 115.

[0112] This PDA30 has the function to perform other communication devices and data communication through networks, such as WAN (Wide Area Network) and LAN (Local Area Network). The Radio Communications Department 304 controls the radio performed between the base transceiver stations of WAN or LAN. Moreover, CPU113 performs oscillating control processing 3 (refer to drawing 14), when it is detected that activation of the processing directed by the actuation input was completed, drives the oscillating actuator 115 through the driving signal generation circuit 114, and vibrates the body case 301.

[0113] In addition, the oscillating actuator 115 is the same as the oscillating actuator 115 explained with the above-mentioned 1st operation gestalt. However, in this operation gestalt, the oscillating actuator 115 is attached inside [body case 301] the opposite side with the field in which the tooth-back side of PDA30, i.e., the display screen, was prepared, and vibrates the body case 301. And this vibration gets across to the hand of the user who is grasping PDA30.

[0114] [Actuation of C-2. 3rd operation gestalt] drawing 14 is a flow chart explaining actuation of the oscillating control processing 3 performed by CPU113 in PDA30 concerning this operation gestalt. This oscillating control processing 3 is performed when activation of the processing which requires the latency time is directed by the actuation input. Here, the processings which require the latency time are download of file data, such as reading processing of a web page, upload, e-mail check processing in which the existence of the electronic mail of self-reliance is checked, starting processing of application software, the copy and package deletion of file data,

initialization processing of the data storage field for example, in memory 112, etc.

[0115] As shown in this drawing, CPU113 performs first processing directed by the actuation input (step S301). Subsequently, it distinguishes whether the processing under activation ended CPU113 (step S302). When processing is not completed, CPU113 continues activation of return and processing to the above-mentioned step S301. Moreover, CPU113 shifts to step S303, when it distinguishes that the processing under activation was completed in the above-mentioned step S302. Since the processing after this step S303 is the same as the processing after step S102 of the oscillating control processing 1 (refer to drawing 5) in which it explained with the above-mentioned 1st operation gestalt, explanation is omitted.

[0116] By considering as such a control configuration, if it detects that activation of the processing directed by the actuation input was completed, CPU113 will drive the oscillating actuator 115 through the driving signal generation circuit 114, and will vibrate the body case 301 of PDA30. Thereby, vibration gets across to the hand of the user who grasps PDA30.

[0117] It is effective to change the gestalt of vibration in a place, according to the case where there is an electronic mail of self-reliance, and the case where there is nothing, when vibration reports activation termination of e-mail check processing for example. Thus, the control approach of changing the gestalt of vibration according to the result of the performed processing is explained below.

[0118] Drawing 15 is a flow chart explaining actuation of the oscillating control processing 4 performed by CPU113 in PDA30 concerning this operation gestalt. As shown in this drawing, CPU113 performs first processing directed by the actuation input (step S401). And CPU113 shifts to (step S402) and step S403, when it distinguishes that the processing under activation was completed.

[0119] Subsequently, CPU113 acquires the activation result of the processing performed in the above-mentioned step S401 (step S403). CPU113 changes the counted value of convention time amount which defines, the impression time amount, i.e., the impression time amount, of a driving signal, according to this activation result (step S404). For example, according to a check result, when e-mail check processing is performed, CPU113 considers convention time amount as as [0.5 seconds], when there is no electronic mail of self-reliance. Moreover, when there is an electronic mail of self-reliance, convention time amount is changed at 1.5 seconds.

[0120] In addition, although detailed explanation is omitted since the processing after step S405 is the same as the processing after step S303 of the oscillating control processing 3 (refer to drawing 14) mentioned above, CPU113 changes the vibration periods of the body case 301 according to the activation result of processing.

[0121] According to this operation gestalt, as explained above, when it is detected that the processing directed by the actuation input was completed, CPU113 drives the oscillating actuator 115 and vibrates the body case 301 of PDA30. Therefore,

PDA30 can report activation termination of the processing directed by the actuation input to a user by vibration. Moreover, according to this operation gestalt, CPU113 changes the vibration periods of the oscillating actuator 115 according to the activation result of processing. Therefore, even if a user does not look at screen information, he can recognize the activation result of the directed processing by vibration periods.

[0122] In addition, although this operation gestalt explained the case where vibration periods were changed according to the activation result of processing, the magnitude of vibration, the count of vibration, etc. may be changed. What is necessary is in short, just to change the gestalt of vibration generated from the oscillating actuator 115 according to the activation result of processing. Moreover, with this operation gestalt, it considered as the configuration which vibrates the body case 301 whole of PDA30. However, it is good also as a configuration which vibrates only the part grasped in case a user grasps PDA30 among the body cases 301.

[0123] Moreover, in this operation gestalt, the case where vibration was given to the configuration which vibrates the body case 301 of PDA30, i.e., the hand which grasps PDA30, was explained. However, you may make it give vibration to the configuration which vibrates two or more actuation keys with which PDA30 is equipped, i.e., the fingertip which performed the actuation input.

[0124] [-- D. -- the 4th -- an operation gestalt] book operation gestalt explains the pocket mold electronic equipment which changes the part to vibrate to the grasping section of a touch panel or a case according to whether pocket mold electronic equipment is grasped by the user. In addition, in this operation gestalt, the same sign shall be used about the part which is common in the above-mentioned 1st operation gestalt. Moreover, the explanation shall be omitted about the part which is common in the 1st operation gestalt.

[0125] [Configuration of D-1. 4th operation gestalt] drawing 16 is drawing which illustrates the internal structure of PDA40 concerning this operation gestalt. In this drawing, PDA40 had liquid crystal display panel 103a which the touch panel 102 piled up, and the display screen of this liquid crystal display panel 103a has faced it opening of the body case 401. Moreover, oscillating actuator 115a is prepared in the rear face of this liquid crystal display panel 103a. This oscillating actuator 115a vibrates a touch panel 102, and gives vibration to the fingertip of the user who performed touch actuation.

[0126] On the other hand, with the field in which the tooth-back side of PDA40, i.e., a display screen, was prepared, oscillating actuator 115b is prepared inside [body case 401] the opposite side. This oscillating actuator 115b gives vibration to the palm of the user who is grasping PDA40 through the body case 401. In addition, each oscillating actuators 115a and 115b are the same as the oscillating actuator 115 explained with the above-mentioned 1st operation gestalt. Moreover, actuation key

104a of the depression type which inputs ON/OFF actuation of a main power supply etc. is prepared in the side face of the body case 401.

[0127] Thus, PDA40 has two oscillating actuators 115a and 115b. Moreover, although illustration is omitted in drawing 16 , PDA40 has a touch sensor, drives one of oscillating actuators according to whether PDA40 is grasped by the user, and generates vibration. When the reason for performing such control vibrates the body case 401 of PDA40 put on a desk, it is for preventing an unpleasant oscillating sound being made by PDA40 moving or hitting with a table in the vibration, at the time of vibration etc.

[0128] In addition, when PDA40 is grasped by the user, while giving vibration to the palm of the user who drives only oscillating actuator 115b and is grasping PDA40 as an example of control with this operation gestalt, when PDA40 is not grasped by the user, the case where vibration is given to the fingertip which drove only oscillating actuator 115a and performed touch actuation is explained. However, it is good also as a configuration which drives both oscillating actuators 115a and 115b, and performs oscillating information, for example when PDA40 is grasped by the user.

[0129] Drawing 17 is a block diagram which illustrates the hardware configuration of PDA40 shown in drawing 16 . As shown in this drawing, as for PDA40, PDA40 has a touch panel 102, a display 103, the key input section 111, memory 112, CPU113, the driving signal generation circuit 114, the oscillating actuators 115a and 115b, and a touch sensor 411.

[0130] A touch sensor 411 is a sensor which detects whether PDA40 is grasped by the user, and supplies a detection result to CPU113. The data point of the driving signal impressed to the oscillating actuators 115a and 115b is stored in memory 112. The frequency of the driving signal impressed to oscillating actuator 115a is made in agreement with the frequency which resonates liquid crystal display panel 103a possessing a touch panel 102, or the frequency which resonates the oscillating actuator 115a itself here. Moreover, the frequency of the driving signal impressed to oscillating actuator 115b is made in agreement with the frequency which resonates the body case 401 of PDA40, or the frequency which resonates the oscillating actuator 115b itself.

[0131] CPU113 performs oscillating control processing 5 (refer to drawing 18), and reports by vibration that the touch actuation to a touch panel 102 was received to a user. However, in this operation gestalt, according to the detection result of a touch sensor 411, CPU113 drives only either between two oscillating actuators 115a and 115b, and generates vibration.

[0132] The driving signal generation circuit 114 generates the driving signal for driving the oscillating actuators 115a and 115b according to the data point supplied from CPU113. Moreover, this driving signal generation circuit 114 impresses a driving signal to the oscillating actuators 115a and 115b according to the directions from CPU113.

[0133] [Actuation of D-2. 4th operation gestalt] drawing 18 is a flow chart explaining actuation of the oscillating control processing 5 performed by CPU113 in PDA40 concerning this operation gestalt. This oscillating control processing 5 is performed for every predetermined period by CPU113 in the period when the touch actuation to a touch panel 102 is permitted.

[0134] As shown in this drawing, CPU113 distinguishes first whether the touch signal was inputted from a touch panel 102 (step S501). CPU113 ends the oscillating control processing 5, when the touch signal was not inputted and it distinguishes. In addition, even if CPU113 is the case where it distinguishes that the touch signal was inputted from a touch panel 102, when the touch location on the touch panel 102 detected based on this signal detects it as having separated from the viewing area of the touch carbon button currently displayed on the display screen, it does not shift to processing of step S502, but ends the oscillating control processing 5.

[0135] On the other hand, subsequently to a user, CPU113 distinguishes whether PDA40 is grasped based on the detection result of a touch sensor 411, when it distinguishes that the touch signal was inputted in the above-mentioned step S501 (step S502). And CPU113 determines the oscillating actuator to drive as oscillating actuator 115b, when PDA40 was grasped by the user and it distinguishes (step S503). That is, when PDA40 is grasped by the user, the grasping section of the body case 401 is vibrated and vibration is given to the palm of the user who is grasping PDA40.

[0136] On the other hand, CPU113 determines the oscillating actuator to drive as oscillating actuator 115a, when PDA40 was not grasped by the user in the above-mentioned step S502 and it distinguishes (step S504). That is, when PDA40 is grasped by the user and is not, a touch panel 102 is vibrated and vibration is given to the fingertip of the user who performed touch actuation.

[0137] In addition, although detailed explanation is omitted since the processing after step S505 is the same as the processing after step S102 of the oscillating control processing 1 (refer to drawing 5) in which it explained with the above-mentioned 1st operation gestalt, CPU113 drives the oscillating actuator determined by processing of the above-mentioned steps S503 or S504, and gives vibration to the grasping section of a touch panel 102 or the body case 401.

[0138] As explained above, according to this operation gestalt, CPU113 has responded to the detection result of a touch sensor 411, drives one [a gap or] oscillating actuator, and generates vibration. Therefore, PDA40 can change the part to vibrate into the grasping section of a touch panel 102 or the body case 401 according to whether PDA40 concerned is grasped by the user.

[0139] In addition, in this operation gestalt, it is good also considering the oscillating actuator used at the time of oscillating information as a configuration which a user can specify. In this case, CPU113 performs a screen display for making a user specify one or more oscillating actuators used at the time of oscillating information. CPU113 will

memorize the assignment information in memory 112, if the oscillating actuator to be used is specified by the actuation input from a user. And CPU113 determines the oscillating actuator to drive according to the assignment information memorized by memory 112, after distinguishing that the touch signal was inputted from the touch panel 102 in the above-mentioned step S501.

[0140] Moreover, drawing 19 is a sectional view which illustrates the internal structure of PDA41 concerning the modification of this operation gestalt. In this drawing, liquid crystal display panel 103a which a touch panel 102 puts on the screen and by which oscillating actuator 115a was installed in the rear face is attached in the body case 401 of PDA41 through the elastic member 451. This elastic member 451 is rubber, urethane, sponge, etc., and as shown in drawing 20 , it is attached in the periphery section of liquid crystal display panel 103a. This elastic member 451 is a member for vibrating efficiently a touch panel 102 and liquid crystal display panel 103a.

[0141] In addition, it divides into plurality and this elastic member 451 may be installed in the periphery section of liquid crystal display panel 103a, as shown in drawing 21 or drawing 22 . Moreover, this elastic member 451 may be constituted using a spring etc. By considering as the configuration which attaches a touch panel 102 and liquid crystal display panel 103a in the body case 401 through the elastic members 451,451a-451f shown in these drawing 20 - drawing 22 , vibration generated from the oscillating actuators 115a and 115b can be efficiently given to a touch panel 102 and liquid crystal display panel 103a. Therefore, a bigger vibration can be given to a user, stopping the drive power of oscillating actuator 115a.

[0142] Moreover, as shown in drawing 23 , it is good also as a configuration which installs oscillating actuator 115c so that both the body case 401 inside by the side of the rear face of liquid crystal display panel 103a which the touch panel 102 piled up, and the tooth back of PDA42, and ** may be touched. The same vibration can be given to the fingertip which performed touch actuation to the touch panel 102, and the hand which grasps PDA42 when it considers as such a configuration.

[0143] Furthermore, as shown in drawing 24 , oscillating actuator 115b may be the configuration of giving vibration directly to the palm of the user who is installed so that the part may be exposed outside from opening prepared in body case 401a, and grasps PDA43. Also when it considers as such a configuration, vibration generated from oscillating actuator 115b can be efficiently given to a user. Moreover, since oscillating actuator 115b can give a user vibration directly in such a case, a warmer vibration is controllable.

[0144] [-- E. -- the 5th -- an operation gestalt] book operation gestalt explains the installation of the tremulor which vibrates a touch panel. Drawing 25 is a sectional view for explaining the internal structure of ATM50 concerning this operation gestalt. In this drawing, the liquid crystal display panel 501 makes the front face of main frame 50a of ATM50 incline, and it is installed in it. On the screen of this liquid crystal display

panel 501, the touch panel 502 is attached through the damper 503. Two oscillating actuators 115a and 115b are installed in this touch panel 502 by the upper part of a touch side, and the lower part. And the body covering 504 which has opening is formed outside at the pan of this touch panel 502.

[0145] Here, the touch panel 502 consists of the transparence and the hard members of a glass substrate etc. Moreover, dampers 503 are oscillating absorption members, such as rubber, and urethane, sponge, and are attached in the periphery section of a touch panel 502. This damper 503 is a member for absorbing the oscillating component which gets across to the liquid crystal display panel 501 among vibration generated from the oscillating actuators 115a and 115b installed in the touch panel 502, and making it vibration not get across to the liquid crystal display panel 501. Moreover, this damper 503 is also bearing the role for vibrating efficiently the touch panel 502 installed in the liquid crystal display panel 501. For this reason, as for a damper 503, being constituted with elastic bodies, such as rubber, is desirable.

[0146] The oscillating actuators 115a and 115b are the same as the oscillating actuator 115 explained with the above-mentioned 1st operation gestalt. Moreover, a damper 503 and the oscillating actuators 115a and 115b are formed in the outside of the display screen field of the liquid crystal display panel 501.

[0147] As shown in this drawing, the liquid crystal display panel 501 is being fixed to main frame 50a of ATM50. On the other hand, the touch panel 502 is attached in the liquid crystal display panel 501 only through the damper 503, and the clearance is prepared between a touch panel 502 and the body covering 504. For this reason, a touch panel 502 vibrates in the direction which becomes perpendicular to the front face of a touch panel 502 by vibration generated from the oscillating actuators 115a and 115b.

[0148] In addition, about the control which generates vibration from the oscillating actuators 115a and 115b according to the touch actuation to a touch panel 502, since what is necessary is just to perform the same control as the oscillating control processing 1 (to refer to drawing 5) in which it explained with the above-mentioned 1st operation gestalt, except for the point that the oscillating actuators 115a and 115b are plurality, explanation is omitted. Moreover, the frequency of the driving signal impressed to the oscillating actuators 115a and 115b in this operation gestalt is made into the frequency which resonates the frequency which resonates a touch panel 502 or oscillating actuator 115a, and the 115b itself.

[0149] As explained above, according to this operation gestalt, ATM50 can vibrate only a touch panel 502 by vibration generated from the oscillating actuators 115a and 115b. The vibration to the liquid crystal display panel 501 is absorbed by the damper 503. Therefore, since the contents of a screen display of the liquid crystal display panel 501 do not blur, as compared with the case where a touch panel is vibrated the whole liquid crystal display panel like the above-mentioned 1st operation gestalt for

example, the contents of a display are legible.

[0150] In addition, as shown in drawing 26 , it is good also as a configuration which installs the oscillating actuators 115a and 115b in the liquid crystal display panel 501 side of a touch panel 502. Moreover, drawing 27 is a sectional view which illustrates the internal structure of ATM51 concerning the modification of this operation gestalt. In this drawing, the touch panel 502 is attached through two oscillating actuators 115a and 115b on the screen of the liquid crystal display panel 501 which was made to incline in the front-face side of main frame 50a of ATM51, and was installed.

[0151] Here, the liquid crystal display panel 501 is being fixed to main frame 50a of ATM51. On the other hand, the touch panel 502 is attached in the liquid crystal display panel 501 only through the oscillating actuators 115a and 115b, and the clearance is prepared between a touch panel 502 and the body covering 504. For this reason, a touch panel 502 vibrates in the direction which becomes perpendicular to the front face of a touch panel 502 by vibration generated from the oscillating actuators 115a and 115b. Moreover, since it is fixed to main frame 50a, although the liquid crystal display panel 501 is in contact with the oscillating actuators 115a and 115b, it hardly vibrates. Therefore, the same effectiveness as the case of the structure shown in drawing 25 also as structure shown in drawing 27 can be acquired.

[0152] Moreover, drawing 28 - drawing 31 are sectional views which illustrate the internal structure of ATM 52, 53, 54, and 55 concerning the modification of others of this operation gestalt. First, as shown in drawing 28 , it is good also as a configuration which attaches in the body covering 504 the liquid crystal display panel 501 by which the touch panel 502 put on the screen, and the oscillating actuators 115a and 115b were installed in the rear face through a damper 503. In this case, a clearance is prepared between the liquid crystal display panel 501 and main frame 50a of ATM52. A touch panel 502 can be vibrated in the direction which becomes perpendicular to the front face by such configuration, then vibration generated from the oscillating actuators 115a and 115b. In addition, the damper 503 in this modification bears the role for vibrating efficiently a touch panel 502 and the liquid crystal display panel 501.

[0153] Moreover, as shown in drawing 29 , it is good also as a configuration which attaches in the body covering 504 the liquid crystal display panel 501 which the touch panel 502 put on the screen through the oscillating actuators 115a and 115b. Also in this case, a clearance is prepared between the liquid crystal display panel 501 and main frame 50a of ATM53. Even if it is such a configuration, a touch panel 502 can be vibrated like the case where it is shown in drawing 28 , by vibration generated from the oscillating actuators 115a and 115b.

[0154] Or as shown in drawing 30 , it is good also as a configuration which attaches in main frame 50a of ATM54 the liquid crystal display panel 501 by which the touch panel 502 put on the screen, and the oscillating actuators 115a and 115b were installed in the rear face through a damper 503. In this case, a clearance is prepared between the

liquid crystal display panel 501 and the body covering 504. A touch panel 502 can be vibrated in the direction which becomes perpendicular to the front face by vibration generated from the oscillating actuators 115a and 115b also as such a configuration.

[0155] Moreover, as shown in drawing 31 , it is good also as a configuration which attaches in main frame 50a of ATM55 the liquid crystal display panel 501 which the touch panel 502 put on the screen through the oscillating actuators 115a and 115b. Also in this case, a clearance is prepared between the liquid crystal display panel 501 and the body covering 504. Even if it is such a configuration, a touch panel 502 can be vibrated like the case where it is shown in drawing 30 , by vibration generated from the oscillating actuators 115a and 115b.

[0156] Although each of each modifications shown in these drawing 28 - drawing 31 vibrates a touch panel 502 the whole liquid crystal display panel 501, vibration can report for touch actuation that ATM 52-55 received the touch actuation to a touch panel 502 to the fingertip of the user who carried out.

[0157] In addition, this operation gestalt explained the case where a liquid crystal display was used as a display. However, displays may be CRT, a plasma display, EL (Electronic Luminescence) display, etc. Moreover, the number of installation of the oscillating actuators 115a and 115b is arbitrary. Furthermore, a damper 503 may be constituted using a spring etc.

[0158] [-- F. -- the 6th -- an operation gestalt] book operation gestalt explains the electronic equipment reported to a user by vibration of a gestalt which is different in the actuation input having been received according to the class of the actuation input. In addition, in this operation gestalt, it explains on the basis of PDA10 explained with the above-mentioned 1st operation gestalt. Therefore, the same sign shall be used about the part which is common in the 1st operation gestalt. Moreover, the explanation shall be omitted about the part which is common in the 1st operation gestalt.

[0159] [-- F-1. -- the 1st -- example] drawing 32 is drawing showing the example of a screen display of PDA10 concerning the 1st example of this operation gestalt. As shown in this drawing, two or more touch carbon button "A" - "G" is displayed on the display screen of PDA10. When a user touches these touch carbon buttons by which a screen display was carried out by the fingertip, the touch panel 102 piled up on the display screen detects touch actuation. In addition, the alphabet assigned to each touch carbon button is what [only] was given in order to identify a touch carbon button.

[0160] Next, drawing 33 is drawing which illustrates wave data table 112a stored in the memory 112 of PDA10. As shown in this drawing, the area data in which the field which this touch carbon button occupies on a touch panel 102 was shown using XY coordinate value, and the data point of the driving signal impressed to the oscillating actuator 115 when this touch carbon button is pushed are stored in wave data table

112a for each [a screen display is carried out] touch carbon button of every.

[0161] Here, the amplitude differs from a configuration, respectively so that the wave of the driving signal matched with each touch carbon button may be illustrated to drawing 34 – drawing 37 . However, in each of these drawings, the frequency f0 of a driving signal is a frequency which resonates liquid crystal display panel 103a possessing the body case 101 of PDA10, and a touch panel 102, or the oscillating actuator 115. Frequency data, amplitude data, etc. which are needed in order to generate these driving signals are stored in wave data table 112a mentioned above as a data point.

[0162] If a user touches the touch panel 102 of PDA10 which has such a configuration by the fingertip, a touch panel 102 will detect touch actuation and will output a touch signal to CPU113. CPU113 asks for XY coordinate data of a touch location based on a touch signal, and specifies the touch carbon button pushed with reference to wave data table 112a. Subsequently, CPU113 reads the data point of the driving signal matched with the specified touch carbon button from wave data table 112a.

[0163] And CPU113 outputs the read data point to the driving signal generation circuit 114. Moreover, CPU113 directs generation of a driving signal to this and coincidence to the driving signal generation circuit 114. Since next processing is the same as the processing after step S104 of the oscillating control processing 1 (refer to drawing 5) in which it explained with the above-mentioned 1st operation gestalt, explanation is omitted.

[0164] According to the 1st example of this operation gestalt, as explained above, when the touch actuation to a touch panel 102 is detected, first, CPU113 detects a touch location and specifies the operated touch carbon button. And CPU113 generates vibration from the oscillating actuator 115 in the oscillatory-type voice matched with the class of touch carbon button. Therefore, PDA10 can change the gestalt of vibration which reports having received touch actuation according to the operated touch carbon button.

[0165] In addition, when the location applicable to neither of the touch carbon buttons is pushed by the user on a touch panel 102, it is good also as a configuration which generates vibration which shows that this touch actuation is invalid from the oscillating actuator 115. Moreover, it is good also as a configuration which vibration periods, the count of vibration, etc. are changed [configuration] and changes oscillatory-type voice.

[0166] Moreover, invention concerning the 1st example of this operation gestalt is applicable instead of a touch panel 102 also to the electronic equipment which has two or more actuation keys. In this case, in the memory of electronic equipment, the data point is memorized for every actuation key. And when it is detected that the actuation key was operated, the control section of electronic equipment reads the data point according to the operated key from memory, and drives the tremulor. The

gestalt of vibration which reports what such a configuration, then a key stroke were received for by electronic equipment can be changed according to the operated key.
[0167] [2nd example of F-2.] drawing 38 and drawing 39 are drawings which illustrate the condition of doing the activity which drags the icon displayed on the display screen of PDA10 by touch actuation to a touch panel 102, and is moved to a garbage can. In addition, the garbage can said here is an icon which orders it deletion of data.
[0168] First, if the icon which a user wants DORAKKU [icon / with the touch actuation to a touch panel 102] is chosen, CPU113 of PDA10 will detect a touch location, and if the touch actuation orders it selection of an icon, it specifies. Wave data table 112b by which the data point of the driving signal impressed to the oscillating actuator 115 for every class of command which an actuation input directs as shown in drawing 40 was stored in the memory 112 of PDA10 is memorized.
[0169] CPU113 reads the data point matched with "selection of an icon" from this wave data table 112b, and drives the oscillating actuator 115. Therefore, vibration which shows that selection of an icon was performed is given to the hand of the user who grasps fingertip and PDA10 of the user who performed touch actuation.
[0170] Moreover, it is made to move, while the user had contacted the fingertip on the touch panel 102, as shown in drawing 38 , and when the selected icon is being dragged, CPU113 is specified if the touch actuation orders it the drag of an icon. Therefore, CPU113 reads the data point matched with the "drag" from wave data table 112b, and drives the oscillating actuator 115. Thereby, vibration which shows that it is among DORAKKU is given to a user. For example, it is desirable to continue and give a weaker vibration in in a drag etc.
[0171] And CPU113 is specified if it is ordered for touch actuation to hold an icon in a garbage can if the icon currently dragged piles up on a garbage can as shown in drawing 39 . Therefore, CPU113 reads the data point matched with "deletion of data" from wave data table 112b, and drives the oscillating actuator 115 while it holds an icon in a garbage can. Thereby, vibration which shows that the icon was deleted is given to the user who performed touch actuation.
[0172] As explained above, according to the 2nd example of this operation gestalt, CPU113 specifies first the class of command which touch actuation directs, when the touch actuation to a touch panel 102 is detected. And CPU113 generates vibration from the oscillating actuator 115 in the oscillatory-type voice matched with the class of specified command. Therefore, PDA10 can change the gestalt of vibration which reports having received touch actuation according to the class of command which touch actuation directs.
[0173] [-- F-3. -- the 3rd -- example] drawing 41 is drawing showing the example of a screen display of PDA10 concerning the 3rd example of this operation gestalt. As shown in this drawing, the "graduation" and the "tongue" for adjusting parameter value, such as a loudness level of sound of PDA10 and intensity of a screen, are

displayed on the display screen of PDA10. A user can drag the location of the "tongue" by which a screen display was carried out by touch actuation to a touch panel 102, and can change it.

[0174] First, if a user clicks a "tongue" by touch actuation to a touch panel 102, CPU113 of PDA10 specifies that the "tongue" was clicked. And CPU113 gives to a user vibration which shows that the "tongue" was clicked.

[0175] Subsequently, when it is made to move while the user had contacted the fingertip on the touch panel 102 and the "tongue" is being dragged along with a "graduation", CPU113 specifies that the "tongue" is dragged. Here, wave data table 112c shown in drawing 42 is memorized by the memory 112 of PDA10 concerning the 3rd example of this operation gestalt. This wave data table 112c classifies into plurality the value of the range which this parameter can take, and stores the data point of the driving signal impressed to the oscillating actuator 115 for every partition.

[0176] CPU113 specifies parameter value according to the location of the dragged "tongue", reads the data point matched with current parameter value from wave data table 112c, and drives the oscillating actuator 115. Therefore, while dragging the "tongue", the vibration according to parameter value is given to the hand of the user who grasps fingertip and PDA10 of the user who is performing touch actuation.

[0177] In addition, as explained below, you may be the configuration of performing wave composition processing of a driving signal. For example, when parameter value can take the numeric value of the range of "0"- "100", as shown in drawing 43 - drawing 45 , the data point of each driving signal in case the case where the case where parameter value is "0", (drawing 43), and parameter value are "50", (drawing 44), and parameter value are "100" (drawing 45) is memorized in memory 112. When the present parameter value is "40", CPU113 sets the wave-like rate of "1" and parameter value "50" to "4" for the wave-like rate of parameter value "0", and compounds both waves. And CPU113 is impressed to the oscillating actuator 115 by making this synthetic wave into a driving signal. Moreover, only the amplitude of a driving signal is changed in proportion to the magnitude of parameter value, and you may make it change the magnitude of vibration.

[0178] As explained above, according to the 3rd example of this operation gestalt, CPU113 generates vibration from the oscillating actuator 115 in the oscillatory-type voice matched with the parameter value changed by touch actuation, when touch actuation of changing parameter value to a touch panel 102 is detected. Therefore, PDA10 can change the gestalt of vibration which reports having received touch actuation according to the parameter value changed by this touch actuation.

[0179] In addition, invention concerning the 3rd example of this operation gestalt is applicable also to the electronic equipment which has the handlers (for example, the slider switch 993 illustrated to drawing 78 , the dial mold switch 994 illustrated to drawing 79) to which it carries out adjustable [of the parameter value] continuously.

In this case, the control section of electronic equipment generates vibration from the tremulor in the oscillatory-type voice matched with the parameter value changed by actuation of this handler, when it is detected that the handler was operated. The gestalt of vibration which reports by this what actuation of a handler was received for by electronic equipment can be changed according to the parameter value changed by actuation of this handler.

[0180] [-- G. -- the 7th -- an operation gestalt] book operation gestalt explains the electronic equipment reported to a user by vibration of a gestalt which is different in touch actuation having been received according to the press level of the touch actuation to a touch panel. In addition, in this operation gestalt, it explains on the basis of PDA10 explained with the above-mentioned 1st operation gestalt. Therefore, the same sign shall be used about the part which is common in the 1st operation gestalt. Moreover, the explanation shall be omitted about the part which is common in the 1st operation gestalt.

[0181] The touch panel which PDA10 has in this operation gestalt can detect two actuation conditions in the condition (with this operation gestalt, this actuation is hereafter described as touch actuation) that a user's fingertip is touching the touch panel, and the condition (this operation gestalt describes press actuation hereafter) that the fingertip is pressing the touch panel by the force more than predetermined press level. A touch panel changes the class of touch signal which is outputted to CPU113 the case of touch actuation, and in the case of press actuation.

[0182] Moreover, wave data table 112d shown in drawing 46 is stored in the memory 112 of PDA10 concerning this operation gestalt. This wave data table 112d, it corresponds to the example of a screen display of the touch carbon button shown in drawing 32 . The area data of this touch carbon button and each data point impressed to the oscillating actuator 115 when [by which touch actuation of this touch carbon button was carried out] a case and press actuation are carried out are stored in wave data table 112d for every touch carbon button.

[0183] In PDA10 which has such a configuration, if touch actuation to a touch panel is performed, a touch panel will output the touch signal which shows that touch actuation was performed to CPU113. CPU113 asks for the coordinate data of a touch location based on a touch signal, and specifies the touch carbon button operated with reference to wave data table 112d. Subsequently, CPU113 reads the data point for touch actuation matched with the specified touch carbon button from wave data table 112d. And CPU113 drives the oscillating actuator 115 using the driving signal generated by the read data point. Moreover, it is also the same as when press actuation to a touch panel is performed. CPU113 reads the data point for press actuation matched with the operated touch carbon button from wave data table 112d, and drives the oscillating actuator 115.

[0184] When it is made to move with the condition that the user touched by

considering as such a configuration, without pressing a touch panel by the fingertip and the location of a touch carbon button is explored, PDA10 gives a user the vibration for touch actuation matched with the class of touch carbon button which the fingertip is touching. That is, in the condition that the user is looking for the location of a touch carbon button, a different feeble vibration for every class of touch carbon button is given to a user, for example. On the other hand, when a user finds out a desired touch carbon button and does press actuation of this touch carbon button, PDA10 gives a user the vibration for press actuation matched with the class of this touch carbon button. That is, a user's push of a touch carbon button gives a user vibration which shows that this actuation was received.

[0185] Such oscillating information control demonstrates especially effectiveness under a situation with the difficult check of the actuation input by vision. For example, applying to car navigation equipment etc. is effective. Moreover, even if it is general electronic equipment, effect is taken under the situation that an actuation input is performed by groping, in the condition of not attaching lighting to midnight, for example.

[0186] As explained above, according to this operation gestalt, CPU113 generates vibration from the oscillating actuator 115 in oscillatory-type voice which is different the case of touch actuation, and in the case of press actuation, when the actuation input to a touch panel is detected. Therefore, PDA10 can change the gestalt of vibration which reports having received this actuation input according to how to carry out the actuation input to a touch panel.

[0187] In addition, the touch panel which receives the condition that a user's fingertip touched the touch panel, as an actuation input, and the touch panel which receives the press more than the predetermined press level by a user's fingertip as an actuation input may be piled up and used. Moreover, the number of sheets of the touch panel piled up in this way is not limited to two sheets.

[0188] [-- H. -- the 8th -- with an operation gestalt] book operation gestalt, it has the sound information mode in which a sound reports that the actuation input was received, and the oscillating information mode in which vibration reports that the actuation input was received, and the electronic equipment which changes information mode according to a surrounding loudness level of sound is explained. In addition, in this operation gestalt, the same sign shall be used about the part which is common in the above-mentioned 1st operation gestalt. Moreover, the explanation shall be omitted about the part which is common in the 1st operation gestalt.

[0189] [Configuration of H-1. 8th operation gestalt] drawing 47 is a block diagram which illustrates the hardware configuration of PDA60. As shown in this drawing, PDA60 has a touch panel 102, a display 103, the key input section 111, memory 112, CPU113, the driving signal generation circuit 114, the oscillating actuator 115, a microphone 601, the sound-volume measuring circuit 602, the beep sound generation

circuit 603, and a loudspeaker 604.

[0190] The sound-volume measuring circuit 602 measures the loudness level of sound based on the analog signal wave of the sound around PDA60 obtained from the microphone 601, and outputs a measurement result to CPU113. The beep sound generation circuit 603 generates the driving signal for being impressed by the loudspeaker 604 according to the directions from CPU113. This driving signal is impressed to a loudspeaker 604, and a beep sound is pronounced.

[0191] This PDA60 has the sound information mode in which a beep sound reports that the actuation input was received, and the oscillating information mode in which vibration reports that the actuation input was received. CPU113 performs information control processing 1 (refer to drawing 48), and reports to a user that the touch actuation to a touch panel 102 was received by the beep sound or vibration. Under the present circumstances, CPU113 changes information mode to sound information mode or oscillating information mode according to the measurement result of the sound-volume measuring circuit 602. The reason for performing change control in such information mode is because there is almost no effectiveness of the information by the beep sound under the noise more than the fixed level for example, in a town etc. CPU113 chooses oscillating information mode at least, when it distinguishes that it is more than the loudness level of sound to which the sound volume around PDA60 was set beforehand.

[0192] [Actuation of H-2. 8th operation gestalt] drawing 48 is a flow chart explaining actuation of the information control processing 1 performed by CPU113 in PDA60 concerning this operation gestalt. This information control processing 1 is performed for every predetermined period by CPU113 in the period when the touch actuation to a touch panel 102 is permitted.

[0193] As shown in this drawing, CPU113 distinguishes first whether the touch signal was inputted from a touch panel 102 (step S601). CPU113 ends the information control processing 1, when the touch signal was not inputted and it distinguishes. On the other hand, subsequently CPU113 distinguishes whether it is more than the loudness level of sound to which the sound volume around PDA60 was set beforehand based on the measurement result of the sound-volume measuring circuit 602, when it distinguishes that the touch signal was inputted (step S602). When CPU113 was not more than the loudness level of sound to which the sound volume around PDA60 was set beforehand and it distinguishes, information mode is determined as sound information mode (step S603). And CPU113 drives the beep sound generation circuit 603, makes a beep sound pronounce from a loudspeaker 604 (step S604), and reports by the beep sound that touch actuation was received to a user.

[0194] On the other hand, when it distinguishes that CPU113 is more than the loudness level of sound to which the sound volume around PDA60 was beforehand set in the above-mentioned step S602,. information mode is determined as oscillating

information mode (step S605). And CPU113 drives the oscillating actuator 115 through the driving signal generation circuit 114, and reports by vibration that touch actuation was received to a user. In addition, since the processing after step S606 is the same as the processing after step S102 of the oscillating control processing 1 (refer to drawing 5) in which it explained with the above-mentioned 1st operation gestalt, explanation shall be omitted.

[0195] As explained above, according to this operation gestalt, CPU113 changes the information mode in which it reports that touch actuation was received to sound information mode or oscillating information mode based on the measurement result of the sound-volume measuring circuit 602. Therefore, it can change automatically whether PDA60 reports by the beep sound whether vibration reports according to surrounding sound volume (noise level).

[0196] In addition, in this operation gestalt, it is good also considering information mode as a configuration which a user can specify. In this case, CPU113 performs a screen display for making a user specify the information mode to be used. CPU113 -- the actuation input from a user -- either sound information mode or oscillating information mode -- if specified as information mode which the above uses, the assignment information will be memorized in memory 112. and the assignment information memorized by memory 112 after CPU113 distinguished that the touch signal was inputted from the touch panel 102 in the above-mentioned step S601 -- following -- information mode -- either sound information mode or oscillating information mode -- it determines above.

[0197] Moreover, as the above-mentioned 1st operation gestalt explained, this oscillating actuator 115 can be used also as a loudspeaker 604 (source of pronunciation) by impressing the sound signal of an audible band to the coil 121 of the oscillating actuator 115. Here, the wave of the driving signal for generating vibration from the oscillating actuator 115 is as being shown in drawing 49 . In addition, in this drawing, the frequency f0 of a driving signal is a frequency which resonates liquid crystal display panel 103a possessing the body case 101 of PDA10, and a touch panel 102, or oscillating actuator 115 self. Moreover, the wave of the driving signal for generating a sound from this oscillating actuator 115 is as being shown in drawing 50 .

[0198] And the wave of the driving signal in the case of performing generating of vibration and generating of a sound to coincidence from the oscillating actuator 115 is as being shown in drawing 51 . The wave shown in this drawing compounds the wave for sound generating shown in the wave for oscillating generating shown in drawing 49 , and drawing 50 . Synthetic processing of the wave for this oscillating generating and the wave for sound generating is performed in the driving signal generation circuit 114. By driving the oscillating actuator 115 using the driving signal shown in these drawing 49 - drawing 51 , generating and pronunciation of vibration are realizable only using the oscillating actuator 115.

[0199] In addition, when giving the function as a source of pronunciation to the oscillating actuator 115 in this way, for example, vibration generated from the oscillating actuator 115 according to impression of a sound signal is transmitted, it is suitable to consider as the configuration which makes the loudness level which made it generate from the oscillating actuator 115 amplify, using liquid crystal display panel 103a, the body case 101, etc. as a sound sound-reinforcement device. Moreover, you may be the configuration of providing sound sound-reinforcement devices, such as for example, cone paper and a horn, in the interior or the exterior of the oscillating actuator 115. Moreover, the sound generated from the oscillating actuator 115 is not limited to information sounds, such as an audible tone, and, naturally playback sounds, such as musical sound and human being's voice, are contained.

[0200] [-- I. -- the 9th -- an operation gestalt] book operation gestalt explains the electronic equipment which changes the sound information mode explained with the above-mentioned 8th operation gestalt, and oscillating information mode according to the beacon received from the base transceiver station. In addition, in this operation gestalt, the same sign shall be used about the part which is common in the above-mentioned 8th operation gestalt. Moreover, the explanation shall be omitted about the part which is common in the 8th operation gestalt.

[0201] [Configuration of I-1. 9th operation gestalt] drawing 52 is a block diagram which illustrates the hardware configuration of PDA70. As shown in this drawing, PDA70 has a touch panel 102, a display 103, the key input section 111, memory 112, CPU113, the driving signal generation circuit 114, the oscillating actuator 115, the beep sound generation circuit 603, a loudspeaker 604, and the Radio Communications Department 701.

[0202] This PDA70 is a migration machine held in the wireless LAN which has two or more base stations. PDA70 performs the base station and radio which cover the wireless area as for which the self-opportunity 70 carries out a ** area, and receives the packet communication service which wireless LAN offers. Moreover, this PDA70 has the sound information mode in which a sound reports that the actuation input was received, and the oscillating information mode in which vibration reports that the actuation input was received.

[0203] The Radio Communications Department 701 controls the radio performed between base stations. This Radio Communications Department 701 superimposes the data for packet communication etc. on a subcarrier under control of CPU113, generates a radio signal, and transmits this radio signal to a base station. Moreover, the Radio Communications Department 701 receives the radio signal sent from a base station, restores to this, and gets the data addressed to self-opportunity 70. Moreover, the Radio Communications Department 701 receives the beacon periodically transmitted from a base station.

[0204] Here, a base station is the radio signal which transmits periodically into the

wireless area of a local station, for example, a beacon is transmitted at about several times of a rate in 1 second. this beacon -- the information mode of PDA70 -- either sound information mode or oscillating information mode -- the control bit data specified above are contained. This control bit data is set up with "3" etc., when [which "2" and neither of the information modes uses] specifying the information mode of PDA70 only as sound information mode, specifying "0" and information mode only as oscillating information mode, specifying "1" and information mode as concomitant use in sound information mode and oscillating information mode, and carrying out thing assignment.

[0205] For example, the base station installed in public facilities, such as a station and a movie theater, transmits the beacon containing control bit data "1" into the wireless area of a local station. Thereby, the information mode of PDA70 which received this beacon is determined as oscillating information mode. In addition, only the inside of the show time amount of a movie specifies the information mode of PDA70 as oscillating information mode, and you may make it, specify concomitant use in sound information mode and oscillating information mode out of show time amount for example, in the base station installed in the movie theater.

[0206] CPU113 stores in memory 112 the control bit data contained in the beacon, if the self-opportunity 70 receives a beacon from the base station which covers the wireless area which is carrying out the ** area. And CPU113 reports to a user that touch actuation was received by the information mode which determined and determined information mode according to the control bit data stored in memory 112, when the touch actuation to a touch panel 102 is detected. Thus, information mode is compulsorily specified with the beacon which PDA70 of this operation gestalt received from the base station.

[0207] [Actuation of I-2. 9th operation gestalt] drawing 53 is a flow chart explaining actuation of the beacon reception performed by CPU113 in PDA70 concerning this operation gestalt. This beacon reception is performed by CPU113, when PDA70 receives the beacon transmitted from the base station. In addition, when PDA70 located in the overlapping area, for example when the wireless area of a base station overlaps the wireless area of other base stations in part receives a beacon from both base stations, CPU113 chooses the powerful beacon of radio field intensity among the received beacons, and performs beacon reception to this beacon.

[0208] As shown in this drawing, CPU113 restores to the beacon received by the Radio Communications Department 701 first (step T101). Subsequently, CPU113 extracts the control bit data contained in the beacon to which it restored (step T102). And CPU113 stores the extracted control bit data in memory 112 (step T103), and ends beacon reception. In addition, when CPU113 compares the control bit data extracted this time with the control bit data already stored in memory 112 and both control bit data are inequalities in step T103, it is good also as a configuration which

overwrites the control bit data extracted this time at memory 112.

[0209] Moreover, CPU113 performs information control processing in which vibration and a beep sound report to a user that the touch actuation to a touch panel 102 was received. The main point is as follows, although detailed explanation is omitted in an illustration list since the information control processing in this operation gestalt is the same as that of the information control processing 1 (refer to drawing 48) in which it explained with the above-mentioned 8th operation gestalt, and abbreviation.

[0210] That is, CPU113 will determine information mode according to the control bit data stored in memory 112, if a touch signal is inputted from a touch panel 102. For example, when the control bit data stored in memory 112 are "0", information mode is determined as sound information mode. And CPU113 drives the beep sound generation circuit 603, makes a beep sound pronounce from a loudspeaker 604, and reports with an information sound that touch actuation was received to a user.

[0211] On the other hand, when the control bit data stored in memory 112 are "1", as for CPU113, information mode is determined as oscillating information mode. And CPU113 is minded driving signal generation circuit 114, drives the oscillating actuator 115, and reports by vibration that touch actuation was received to a user.

[0212] As explained above, according to this operation gestalt, CPU113 determines the information mode in which it reports that touch actuation was received, according to the beacon received from the base station. Therefore, the information mode of PDA70 which carries out a ** area can be specified in the wireless area of a local station by the base station side. Therefore, it becomes possible to, change automatically the information mode of PDA70 located in public facilities, such as a movie theater and a station, to oscillating information mode from sound information mode for example, even if a user does not make a setting change etc.

[0213] In addition, as the above-mentioned 8th operation gestalt explained, it is good also as a configuration using the oscillating actuator which has a function as a loudspeaker 604. Moreover, invention concerning this operation gestalt of the ability to apply [the portable telephone held in the migration packet communication network of for example, a PDC (Personal Digital Cellular) method and] to a PHS (Personal Handyphone System: trademark) terminal is natural.

[0214] [-- J. -- the 10th -- with an operation gestalt] book operation gestalt, it has the function in which electronic equipment acquires the current position of a self-opportunity, and the electronic equipment which changes sound information mode and oscillating information mode based on the current position of a self-opportunity is explained. In addition, since PDA concerning this operation gestalt has the same hardware configuration (refer to drawing 52) as PDA70 explained with the above-mentioned 9th operation gestalt, it shall use the same sign. Moreover, the explanation shall be omitted about the part which is common in the 9th operation gestalt.

[0215] In PDA70 concerning this operation gestalt, the Radio Communications Department 701 receives the beacon periodically transmitted from a base station. In order to identify the base station which transmitted the beacon, the base station ID is included in this beacon. PDA70 uses the base station ID included in this beacon as positional information which shows the current position of the self-opportunity 70.

[0216] Information mode judging table 112e shown in drawing 54 is stored in memory 112. The base station ID which shows the area which makes information mode of PDA70 oscillating information mode is stored in this information mode judging table 112e. The base station ID stored in this information mode judging table 112e is ID of the base station which it is troubled, for example, was installed in the public facility by surrounding people, when sound information mode is used. This information mode judging table 112e is transmitted to PDA70 through a base station from the service control station of wireless LAN.

[0217] In PDA70 which has the configuration explained above, CPU113 will perform beacon reception, if a beacon is received from the base station which covers the wireless area as for which the self-opportunity 70 is carrying out the ** area. In this beacon reception, CPU113 extracts the base station ID included in the beacon to which it restored by the Radio Communications Department 701, and stores this base station ID in memory 112 as positional information of the self-opportunity 70.

[0218] Moreover, CPU113 performs information control processing in which vibration and a beep sound report to a user that the touch actuation to a touch panel 102 was received. When touch actuation of on this information control processing and as opposed to a touch panel 102 in CPU113 is detected, the base station ID which shows the current position of the self-opportunity 70 stored in memory 112 is compared with each base station ID stored in information mode judging table 112e.

[0219] And CPU113 reports to a user that touch actuation was received according to the information mode (for example, sound information mode) beforehand set up by the user, when the base station ID which shows the current position of the self-opportunity 70 is not stored in information mode judging table 112e. Moreover, when the base station ID which shows the current position of the self-opportunity 70 is stored in information mode judging table 112e, CPU113 determines information mode as oscillating information mode, and reports by vibration that touch actuation was received to a user. In addition, since the above-mentioned 8th operation gestalt has already described control of the beep sound generation circuit 603 at the time of sound information mode, and a loudspeaker 604, and control of the driving signal generation circuit 114 at the time of oscillating information mode, and the oscillating actuator 115, explanation is omitted.

[0220] As explained above, according to this operation gestalt, CPU113 determines the information mode in which it reports that touch actuation was received, according to the positional information which shows the current position of PDA70. Even if a

user does not make a setting change, changing from sound information mode to oscillating information mode automatically etc. can do information mode of PDA70 which follows, for example, is located in public facilities, such as a movie theater and a station.

[0221] In addition, this operation gestalt explained the case where the base station ID included in the beacon received from the base station was used as positional information. However, it is good also as a configuration which determines information mode using the positional information which shows the LAT LONG of the current position of the self-opportunity 70 which added the GPS (Global Positioning System) function to this PDA70 further, and was acquired by the GPS function. Moreover, when wireless LAN offers positioning service of a migration machine, PDA70 is good also as a configuration which receives the positional information (LAT LONG information) which shows the current position of the self-opportunity 70 from a base station, and determines information mode using this positional information. However, it is necessary to use as the area data based on LAT LONG information instead of a base station ID the area data stored in information mode judging table 112e in these cases.

[0222] Moreover, customize by the user is possible for information mode judging table 112e. For example, additional registration of the base station ID which shows the current position of the self-opportunity 70 stored in memory 112 can be carried out at information mode judging table 112e by performing registration processing in the location which a user wants to make into oscillating information mode.

[0223] Moreover, as the above-mentioned 8th operation gestalt explained, it is good also as a configuration using the oscillating actuator which has a function as a loudspeaker 604. Moreover, invention concerning this operation gestalt of the ability to apply [the portable telephone held in the migration packet communication network of a PDC method and] to a PHS terminal is natural.

[0224] [-- K -- the 11th -- with an operation gestalt] book operation gestalt, it has two or more tremulor and the electronic equipment which controls the signal wave form of the driving signal impressed to each tremulor based on the touch location on a touch panel is explained. In addition, in this operation gestalt, the same sign shall be used about the part which is common in the above-mentioned 5th operation gestalt. Moreover, the explanation shall be omitted about the part which is common in the 5th operation gestalt.

[0225] [Configuration of K-1. 11th operation gestalt] drawing 55 is drawing for explaining ATM concerning this operation gestalt. As shown in this drawing, in the rear face of the liquid crystal display panel 501 which the touch panel 502 piled up, a total of four oscillating actuators 115a, 115b, 115c, and 115d are installed in the four corners. Thus, the reason for installing two or more oscillating actuators 115a-115d is because it is difficult for the fingertip of the user who performed touch actuation to

give sufficient vibration with one tremulor by the electronic equipment which has large-sized display screens, such as ATM and a personal computer.

[0226] the case where oscillating information is performed with this operation gestalt using two or more of these oscillating actuators 115a-115d -- each oscillating actuator 115 -- a-115d is driven efficiently, and the control for giving a bigger vibration to a user's fingertip is explained, holding down the power consumption which oscillating information takes.

[0227] Drawing 56 is a block diagram which illustrates the hardware configuration of ATM90 concerning this operation gestalt. As shown in this drawing, ATM90 has a touch panel 502, a display 901, memory 902, the driving signal generation circuit 903, the oscillating actuators 115a-115d, and CPU904.

[0228] A touch panel 502 outputs the touch signal which shows the touch location on a touch panel 502 according to touch actuation to CPU904. Moreover, a display 901 has the liquid crystal display panel 501 and the drive circuit which performs the display control of this liquid crystal display panel 501. A program, data, etc. for controlling ATM90 are stored in memory 902. Moreover, the data point of the driving signal impressed to each oscillating actuators 115a-115d is stored in this memory 902. In addition, the wave configuration of the driving signal impressed to each oscillating actuators 115a-115d in this operation gestalt is the same. Moreover, the frequency of this driving signal is made in agreement with the frequency which resonates the liquid crystal display panel 501 possessing a touch panel 502, or the frequency which resonates the oscillating actuator 115a-115d itself.

[0229] The driving signal generation circuit 903 generates the driving signal for driving each oscillating actuators 115a-115d according to the data point and phase data which are supplied from CPU904. Moreover, this driving signal generation circuit 903 impresses a driving signal to each oscillating actuators 115a-115d according to the directions from CPU904. Each oscillating actuators 115a-115d are the same as the oscillating actuator 115 explained with the above-mentioned 1st operation gestalt.

[0230] CPU904 controls each part of equipment connected through the bus 905 by performing the program stored in memory 902. When oscillating control processing 6 (refer to drawing 57 and drawing 58) is performed and the touch actuation to a touch panel 502 is detected, this CPU904 drives each oscillating actuators 115a-115d through the driving signal generation circuit 903, and vibrates a touch panel 502 and the liquid crystal display panel 501.

[0231] [Actuation of K-2. 11th operation gestalt] drawing 57 and drawing 58 are the flow charts explaining actuation of the oscillating control processing 6 performed by CPU904 in ATM90 concerning this operation gestalt. This oscillating control processing 6 is performed for every predetermined period by CPU904 in the period when the touch actuation to a touch panel 502 is permitted.

[0232] As shown in drawing 57 , CPU904 distinguishes first whether the touch signal

was inputted from a touch panel 502 (step S701). CPU904 ends the oscillating control processing 6, when the touch signal was not inputted and it distinguishes. Moreover, when it distinguishes that the touch signal was inputted, CPU904 is based on this touch signal, and pinpoints the touch location on a touch panel 502 (XY coordinate value) (step S702). In addition, when the touch location on a touch panel 502 had separated from the viewing area of the touch carbon button currently displayed on the display screen and it distinguishes, CPU904 does not shift to processing of step S703, but can also end the oscillating control processing 6.

[0233] Subsequently, CPU904 searches for a touch location, such as computing a touch location and each oscillating actuators [115a-115d] slant range, and each oscillating actuators [115a-115d] physical relationship, as shown in drawing 55 (step S703). Moreover, CPU904 performs vibrational analysis, using as a parameter a touch location and each oscillating actuators [115a-115d] physical relationship, the quality of the material of the liquid crystal display panel 501 by which the oscillating actuators 115a-115d were installed, the elastic force of a damper 503, etc. In addition, data are beforehand stored in memory 902 as a result of the vibrational analysis according to each touch location on a touch panel 502, and it is good also as a configuration which uses data as a result of this vibrational analysis. It is not necessary to carry out data processing of such a configuration, then the vibrational analysis according to a touch location on real time. And by the mutual intervention of the oscillatory wave which makes it generate from each oscillating actuators 115a-115d, CPU904 computes the phase of the driving signal impressed to each oscillating actuators 115a-115d so that the amplitude of the vibration in a touch location may become the largest (step S704).

[0234] Then, CPU904 reads the data point of the same driving signal impressed to each oscillating actuator 115 from memory 902 (step S705). Subsequently, CPU904 outputs the data point read from memory 902, and the phase data for each oscillating actuator 115a-115d computed in the above-mentioned step S704 to the driving signal generation circuit 903. Moreover, CPU904 directs generation of a driving signal to this and coincidence to the driving signal generation circuit 903 (step S706). The driving signal generation circuit 903 generates the driving signal impressed to each oscillating actuators 115a-115d using the data point and phase data which were supplied from CPU904. Although it omits explanation except for the point that the oscillating actuators 115a-115d to drive are plurality since the processing after step S707 is the same as the processing after step S104 of the oscillating control processing 1 (refer to drawing 5) in which it explained with the above-mentioned 1st operation gestalt The oscillatory wave which has the phase computed in the above-mentioned step S704 by this oscillating control processing 6 from each oscillating actuators 115a-115d is given to a touch panel 502.

[0235] As explained above, according to this operation gestalt, CPU904 adjusts the phase of the driving signal impressed to each oscillating actuators 115a-115d by the

mutual intervention of the oscillatory wave which makes it generate from each oscillating actuators 115a-115d so that the amplitude of vibration produced in the touch location on a touch panel 502 may become the largest. therefore, ATM90 -- each oscillating actuator 115 -- a-115d is driven efficiently, and a bigger vibration can be given to a user's fingertip, holding down the power consumption which oscillating information takes.

[0236] In addition, this operation gestalt explained the case where the phase of the driving signal impressed to each oscillating actuators 115a-115d was adjusted. However, it is good also as a configuration which adjusts the amplitude of a driving signal etc. in addition to a phase. Moreover, the number of installation of an oscillating actuator is not limited to four pieces. Moreover, each oscillating actuator may be installed so that it may be put between the liquid crystal display panel 501 and a touch panel 502, as it could be installed in the touch panel 502 or was shown in drawing 27 .

[0237] Moreover, it is good also as a configuration which stores the data table which classifies the front face of a touch panel 502, computes beforehand the phase data of a driving signal impressed to each oscillating actuators 115a-115d for every partition when touch actuation of the classified field concerned is carried out, and memorized this calculation result in the unit which is touch area extent in case a fingertip touches a touch panel 502, for example in memory 902. When it considers as such a configuration, it is not necessary to carry out data processing of the phase of the driving signal impressed to each oscillating actuators 115a-115d based on a touch location on real time. Therefore, the speed of response of the oscillating information to touch actuation can be raised.

[0238] Moreover, drawing 59 and drawing 60 are the sectional views for explaining ATM concerning the modification of this operation gestalt. The laminating of the deformation layer 550 which covered hyperviscous fluid material and the matter of gel or the shape of a fine particle by the deformable protective coat is carried out to the front face of the touch panel 502 of ATM concerning this modification. In addition, the matter of the shape of the fluid material which constitutes this deformation layer 550, gel, and a particle, and the color of a protective coat are transparent.

[0239] In such ATM, a drive of the oscillating actuators 115a-115d produces a wave on the front face of the deformation layer 550 by vibration generated from each oscillating actuators 115a-115d. CPU of ATM -- each oscillating actuator 115 -- the phase of the driving signal impressed to each oscillating actuators 115a-115d by the mutual intervention of the wave produced every a-115d so that the height of the front face of the deformation layer 550 in a touch location may become higher than the time of un-touching etc. is adjusted. Thereby, as shown in drawing 59 , the part of a touch location can be upheaved in the front face of the deformation layer 550.

[0240] or -- reverse -- CPU of ATM -- each oscillating actuator 115 -- the phase of the driving signal impressed to each oscillating actuators 115a-115d by the mutual

intervention of the wave produced every a-115d so that the height of the front face of the deformation layer 550 in a touch location may become lower than the time of un-touching etc. is adjusted. Thereby, the part of a touch location can be made to sediment in the front face of the deformation layer 550, as shown in drawing 60 .

[0241] Thus, according to this modification, making it change can report to a user that touch actuation was received for the thickness of the deformation layer 550. Moreover, the feeling of pushing of the touch carbon button by which a screen display is carried out as opposed to the user who is performing touch actuation by performing drive control of each oscillating actuators 115a-115d so that the surface part of a touch location may be made to sediment in the deformation layer 550 can be given.

[0242] In addition, in this modification, when the amplitude of vibration generated from each oscillating actuators 115a-115d, a wave configuration, the direction of vibration, etc. perform drive control of the oscillating actuators 115a-115d with a phase, it becomes an important element. It is desirable to consider as the configuration which stores the data table which classifies the front face of a touch panel 502, computes beforehand the data point of the driving signal impressed to each oscillating actuators 115a-115d for every partition when touch actuation of the classified field concerned is carried out, and memorized this calculation result from such a thing in the unit of touch area extent when a fingertip describes a touch panel 502, for example in memory.

[0243] [-- L. -- the 12th -- with an operation gestalt] book operation gestalt, it has two or more tremulor like the above-mentioned 11th operation gestalt, and the electronic equipment which changes the tremulor driven based on the touch location on a touch panel is explained. In addition, in this operation gestalt, the same sign shall be used about the part which is common in the above-mentioned 11th operation gestalt. Moreover, the explanation shall be omitted about the part which is common in the 11th operation gestalt.

[0244] [Configuration of L-1. 12th operation gestalt] drawing 61 is drawing for explaining ATM concerning this operation gestalt. As shown in this drawing, in the rear face of the liquid crystal display panel 501 which the touch panel 502 piled up, a total of four oscillating actuators 115a-115d are installed in the four corners. moreover, it is shown in this drawing -- as -- the touch on a touch panel 502 -- the operational field is classified into two or more fields A1 - A5. With this operation gestalt, when performing oscillating information, according to to which field the touch location on a touch panel 502 is included among a field A1 - A5, the oscillating actuator to drive is changed out of the oscillating actuators 115a-115d.

[0245] The hardware configuration of ATM concerning this operation gestalt is the same as that of what was shown in drawing 56 in the above-mentioned 11th operation gestalt. However, drive place judging table 902a shown in drawing 62 is stored in memory 902. As shown in this drawing, the area data in which the partition field

concerned was shown using XY coordinate value, and the identification information of the oscillating actuator driven when touch actuation of this partition field is carried out are stored in this drive place judging table 902a for every partition field A1 on a touch panel 502 – A5. In addition, in this drawing, the sign given to each oscillating actuators 115a–115d is used as identification information of an oscillating actuator.

[0246] When touch actuation of the field A1 is carried out on the touch panel 502 shown in drawing 61 , for example according to this drive place judging table 902a, only oscillating actuator 115a drives. Moreover, when touch actuation of field A5 is carried out on a touch panel 502, all the oscillating actuators 115a–115d drive.

[0247] When the touch actuation to a touch panel 502 is detected, CPU904 detects the touch location and determines the oscillating actuator driven with reference to drive place judging table 902a. And CPU904 drives the oscillating actuator which made [above-mentioned] a decision through the driving signal generation circuit 903, and vibrates a touch panel 502 and the liquid crystal display panel 501.

[0248] [Actuation of L–2. 12th operation gestalt] drawing 63 is a flow chart explaining actuation of the oscillating control processing 7 performed by CPU904 in ATM concerning this operation gestalt. This oscillating control processing 7 is performed for every predetermined period by CPU904 in the period when the touch actuation to a touch panel 502 is permitted.

[0249] As shown in this drawing, CPU904 distinguishes first whether the touch signal was inputted from a touch panel 502 (step S801). CPU904 ends the oscillating control processing 7, when the touch signal was not inputted and it distinguishes. Moreover, when it distinguishes that the touch signal was inputted, CPU904 is based on this touch signal, and pinpoints the touch location on a touch panel 502 (XY coordinate value) (step S802).

[0250] Subsequently, CPU904 pinpoints the partition field where a touch location is included with reference to drive place judging table 902a shown in drawing 62 , and determines the oscillating actuator to drive (step S803). Then, CPU904 reads the data point of the driving signal for driving the determined oscillating actuator from memory 902 (step S804). And CPU904 outputs the identification information of the oscillating actuator determined as the data point read from memory 902 in the above-mentioned step S803 to the driving signal generation circuit 903. Moreover, CPU904 directs generation of a driving signal to this and coincidence to the driving signal generation circuit 903 (step S805). In addition, except for the point of driving only the oscillating actuator specified among two or more oscillating actuators 115a–115d, since the processing after step S806 is the same as the processing after step S104 of the oscillating control processing 1 (refer to drawing 5) in which it explained with the above-mentioned 1st operation gestalt, it omits explanation.

[0251] As explained above, according to this operation gestalt, CPU904 changes the oscillating actuator to drive according to the touch location on a touch panel 502.

therefore, a touch location [as opposed to a touch panel 502 in ATM] -- responding -- each oscillating actuator 115 -- a-115d can be made to drive efficiently

[0252] In addition, with this operation gestalt, it considered as the configuration which memorizes the identification information of the oscillating actuator driven when the field on a touch panel 502 is beforehand classified into two or more fields and touch actuation of the partition field concerned is carried out for every partition field in memory 902. However, it is good also as a configuration which detects the touch location, computes the touch location concerned and each oscillating actuators [115a-115d] distance, and drives the nearest oscillating actuator, for example when the touch actuation to a touch panel 502 is detected.

[0253] [-- M. -- the 13th -- with an operation gestalt] book operation gestalt, it uses for the above 1st - the 12th operation gestalt, and the suitable tremulor is explained. In addition, the oscillating actuator in this operation gestalt is a linear oscillating actuator of the permanent magnet ejector half which the permanent magnet is used [ejector half] as a movable spindle, makes electromagnetic force perform a linear reciprocating motion to a movable spindle, and generates vibration.

[0254] [-- M-1. -- the 1st -- example] drawing 64 is a sectional view which illustrates the internal structure of the oscillating actuator 950 concerning the 1st example of this operation gestalt. In this drawing, the oscillating actuator 950 has a coil 962, the movable spindle 963 (pyramid of medulla oblongata), the brake member 964, and a spring 966 in the case 961 interior. In addition, in this drawing, the vibrated body with which the oscillating actuator 950 gives vibration shall be prepared in the location which counters on both sides of a case 961 to a coil 962. Moreover, the case 961 is sealed and functions as magnetic shielding. What is necessary is just to form forming a case 961 by the conductive matter and considering as touch-down or same electric potential, or a case 961 with the magnetic substance with large permeability, in order to give the function as such magnetic shielding to a case 961.

[0255] A coil 962 is a coil which has an approximately cylindrical configuration, as shown in this drawing, and it is being fixed to the case 961. When driving the oscillating actuator 950, alternating current (driving signal) is impressed to this coil 962.

[0256] The movable spindle 963 is a spindle of the shape of an approximate circle column which was located in the upper part of a coil 962 and was formed with the permanent magnet. The circular ring-like crevice in which the upper limit section of a coil 962 is settled is formed in the inferior surface of tongue of this movable spindle 963. The movable spindle 963 is in the condition in which a reciprocating motion linear in the vertical direction is possible among drawing, and is supported with the spring 966 by the space formed in the case 961 interior. As this spring 966 is shown in this drawing, one edge is tied to the case 961 (base member) which touches the vibrated body, and the other end is tied to the movable spindle 963. In addition, the rubber of the shape for example, of a string etc. may use the supporter material constituted by

using an elastic body instead of a spring 966.

[0257] This movable spindle 963 will perform a linear reciprocating motion in the vertical direction among drawing by the magnetism generated from this coil 962, if a driving signal is impressed to a coil 962. As reaction force of a reciprocating motion of this movable spindle 963, vibration acceleration arises into case 961 part to which the spring 966 was tied. In addition, although the oscillating component transmitted from the movable spindle 963 through a spring 966 joins case 961 part to which the spring 966 was tied besides the reaction force of this reciprocating motion with the reciprocating motion of the movable spindle 963, the base of the oscillating generating principle in this oscillating actuator 950 is to use the vibration acceleration produced as reaction force of a reciprocating motion of the movable spindle 963.

[0258] The brake member 964 has the brush 965 which always touches the side face of the movable spindle 963. This brush 965 is designed so that moderate contact resistance may be given to the side face of the movable spindle 963. Here, when a driving signal is impressed to a coil 962 and the movable spindle 963 is reciprocating, if the contact resistance which a brush 965 gives to the movable spindle 963 is most, it is not in the hindrance of the reciprocating motion. On the other hand, when impression of the driving signal to a coil 962 is stopped, the reciprocating motion of the movable spindle 963 stops promptly by the contact resistance mentioned above.

[0259] That is, this brake member 964 acts as a brake for stopping the reciprocating motion of the movable spindle 963 promptly, when impression of the driving signal to a coil 962 is stopped. In addition, the member formed with sponge, urethane, the felt, rubber, etc. may be used instead of a brush 965.

[0260] Drawing 65 - drawing 67 are the top views showing the example of arrangement of the brake member 964, and show the case where the interior of the oscillating actuator 950 is seen from the method of drawing Nakagami of the sectional view shown in drawing 64 . Drawing 65 shows the example which has arranged three brakes member 964a at intervals of 120 degrees around the movable spindle 963. Moreover, drawing 66 shows the example which carried out opposite arrangement of the two brakes member 964b on both sides of the movable spindle 963. Moreover, drawing 67 shows the example which has arranged cylinder-like one brake member 964c so that the perimeter of the movable spindle 963 may be enclosed.

[0261] Here, when only for example, one brake member 964a is prepared in the perimeter of the movable spindle 963, contact resistance joins the movable spindle 963 only from one direction which touches brush 965of this brake member 964a a. For this reason, the posture of the movable spindle 963 will collapse at the time of a reciprocating motion, and Bure will arise towards vibration generated from the oscillating actuator 950. Moreover, at the time of an impression halt of a driving signal, since the contact resistance by brush 965a joins the movable spindle 963 from an one direction, the posture of the movable spindle 963 cannot collapse and a reciprocating

motion cannot be stopped promptly. Moreover, big Bure will arise in the oscillating direction also at the time of an impression halt of a driving signal.

[0262] Since it is above, as shown in drawing 65 - drawing 67 , arrangement of the brake members 964a-964c by which the contact resistance of Brushes 965a-965c joins homogeneity from a perimeter to the movable spindle 963 is needed. Moreover, in order to inhibit wear of the brushes 965a-965c by secular change, and deformation of the brake members 964a-964c, it is the range which does not cause trouble to the reciprocating motion of the movable spindle 963, and it is effective to take as large the contact surface of the movable spindle 963 and Brushes 965a-965c as possible.

[0263] When impression of the driving signal of the period T1 shown in drawing 68 is stopped, as the oscillating actuator without the brake mechanism of such a movable spindle 963 is shown in drawing 69 , the reciprocating motion of the movable spindle 963 will not immediately stop, but an unnecessary vibration will remain. Therefore, such an oscillating actuator cannot give a user actuation feelings, such as a feeling of a click which must show the strength of vibration clearly to the inside of a short time, by oscillating stimulus. Moreover, similarly MERIHARI at the time of vibration and un-vibrating cannot be attached clearly.

[0264] On the other hand, according to the 1st example of this operation gestalt, when impression of the driving signal shown in drawing 68 is stopped, the oscillating actuator 950 is promptly stopped for the reciprocating motion of the movable spindle 963 by the contact resistance of the brake member 964, as shown in drawing 70 . Therefore, the actuation feeling which an unnecessary vibration all used as "**** dust" like a feeling of a click can be given to a user by oscillating stimulus. Moreover, MERIHARI at the time of vibration and un-vibrating can be attached clearly.

[0265] [-- M-2. -- the 2nd -- example] drawing 71 is a sectional view which illustrates the internal structure of the oscillating actuator 951 concerning the 2nd example of this operation gestalt. In this drawing, the oscillating actuator 951 has a coil 962, the movable spindle 963, a spring 966, the brake member 971, and the coil 972 for brakes in the case 961 interior. In addition, in this drawing, the vibrated body is prepared in the location which counters on both sides of a case 961 to a coil 962. Moreover, since a case 961, a coil 962, and the movable spindle 963 are the same as the 1st example of this operation gestalt, explanation is omitted.

[0266] The brake member 971 has brake side 971a and magnet 971b with which the front face was covered with rubber. Moreover, the spring 973 which draws brake side 971a near to the side face of the movable spindle 963 is attached in this brake member 971. As for the brake member 971, brake side 971a is forced on the side face of the movable spindle 963 by the force of a spring 973 in the period when the driving signal is not impressed to the coil 972 for brakes. On the other hand, since magnet 971b can draw the brake member 971 near to the coil 972 for brakes to the coil 972 for brakes at the period when the driving signal is impressed, brake side 971a

separates from the side face of the movable spindle 963. In addition, sponge, urethane, the felt, a brush, etc. may be attached in the front face of brake side 971a instead of rubber.

[0267] Drawing 72 is drawing which illustrates the circuitry for impressing a driving signal to a coil 962 and the coil 972 for brakes. In this drawing, an oscillator 974 oscillates the driving signal for driving a coil 962. The example of a wave of the driving signal oscillated from this oscillator 974 is shown in drawing 73 . The movable spindle 963 reciprocates by an alternating current wave form as shown in this drawing being impressed to a coil 962. Moreover, the brake control circuit 975 generates the driving signal impressed to the coil 972 for brakes. As this brake control circuit 975 supervises the driving signal oscillated from an oscillator 974 and shows it to drawing 74 , during the period T2 when the driving signal is oscillated from the oscillator 974 outputs the driving signal of a square wave to the coil 972 for brakes.

[0268] Therefore, since a driving signal is impressed to the period when the oscillator 974 is impressing the driving signal to the coil 962 from the brake control circuit 975 to the coil 972 for brakes, brake side 971a of the brake member 971 separates from the side face of the movable spindle 963. Moreover, in this period, since the driving signal is supplied to the coil 962 from the oscillator 974, the movable spindle 963 reciprocates. On the other hand, when impression of the driving signal from an oscillator 974 to a coil 962 is stopped, impression of the driving signal from the brake control circuit 975 to the coil 972 for brakes is also stopped. Therefore, brake side 971a of the brake member 971 is forced on the side face of the movable spindle 963, and stops the reciprocating motion of the movable spindle 963 promptly. Therefore, the same effectiveness as the 1st example of this operation gestalt mentioned above is done so.

[0269] [--- M-3. --- the 3rd --- example] drawing 75 is a sectional view which illustrates the internal structure of the oscillating actuator 952 concerning the 3rd example of this operation gestalt. In this drawing, the oscillating actuator 952 has a coil 962, the movable spindle 963, and a spring 966 in the case 961 interior. These coils 962, the movable spindle 963, and a spring 966 are the same as the 1st example of this operation gestalt. Moreover, in this drawing, the vibrated body is prepared in the location which counters on both sides of a coil 962 and a case 961 in contact with the case 961.

[0270] Next, drawing 76 is drawing which illustrates the circuitry for impressing a driving signal to a coil 962. Since the oscillator 974 shown in this drawing is the same as the 2nd example of this operation gestalt, explanation is omitted. A control circuit 981 performs switch control of two switches SW1 and SW2 in a switching circuit 982. This control circuit 981 supervises the driving signal (refer to drawing 73) oscillated from an oscillator 974, and as shown in drawing 77 , it outputs the CTRL signal with which during the period T2 when the driving signal is oscillated serves as "Hi" level

from an oscillator 974. The switches SW1 and SW2 of a switching circuit 982 connect an oscillator 974 and a coil 962, when the CTRL signal supplied from a control circuit 981 is "Hi" level. Therefore, a driving signal is impressed for a CTRL signal from an oscillator 974 between "Hi" level to a coil 962, and the movable spindle 963 reciprocates.

[0271] On the other hand, if the CTRL signal supplied from a control circuit 981 is set to "Low" level (i.e., if impression of the driving signal from an oscillator 974 to a coil 962 is stopped), the switches SW1 and SW2 of a switching circuit 982 will change a contact, as shown in drawing 76 , and will short-circuit a coil 962. Therefore, the reciprocating motion of the movable spindle 963 can be promptly stopped according to an electromagnetic-brake operation at the time of an impression halt of a driving signal. Therefore, the same effectiveness as the 1st example of this operation gestalt mentioned above is done so.

[0272] If the oscillating actuators 950-952 shown in example [1st] - the 3rd example of this operation gestalt explained above are used as tremulor of the electronic equipment in the above 1st - the 12th operation gestalt, vibration given to a user can be controlled more suitably.

[0273] Because, these oscillating actuators 950-952 are first equipped with the brake mechanism the 1st. Therefore, the strength of vibration must be clearly shown in the inside of a short time, for example, actuation feelings, such as a feeling of a click, can be clearly given to a user.

[0274] To the 2nd, since these oscillating actuators 950-952 are linear oscillating actuators, its direction precision of vibration to generate is high. Moreover, since these oscillating actuators 950-952 have held the coil 962 and the movable spindle 963 in the interior of the case 961 sealed as magnetic shielding, they do not receive the effect of magnetism in the 3rd from surrounding electronic parts etc. Therefore, gap does not arise towards vibration generated from the oscillating actuators 950-952, or distortion does not arise in the amplitude configuration of vibration. vibration generated from the oscillating actuators 950-952 with the above advantages [2nd and 3rd] -- more -- the grain -- it becomes possible to control densely. Therefore, when touch actuation was performed to the touch panel, or when depression actuation of a thin actuation key is performed, a feeling of pushing and a feeling of a click can be given to a user by oscillating stimulus. Moreover, the oscillating actuators 950-952 do not produce malfunction by magnetism to surrounding electronic parts etc.

[0275] These oscillating actuators 950-952 are formed into 1 package by the 4th. Therefore, as compared with the case where separation installation of the member of an oscillating actuator is carried out, the right and wrong of the installation precision of a permanent magnet and a coil hardly arise probably. Moreover, it is hard to produce aggravation of the installation precision of the permanent magnet by secular

change, and a coil. Therefore, vibration can be generated in the precision stabilized from the oscillating actuators 950-952. Moreover, inclusion on electronic equipment is easy. Furthermore, even if the case where base materials which support the vibrated members (for example, a touch panel, a liquid crystal display panel, etc.) in which the oscillating actuators 950-952 were installed, such as a body of electronic equipment and a case, are not certainly being fixed, and the mass of a base material are the cases which are not large enough to a vibrated member, the oscillating actuators 950-952 can give vibration of sufficient magnitude to a vibrated member. This is suitable when it uses for lightweight electronic equipment or the electronic equipment of a pocket mold especially.

[0276] The oscillating actuators 950-952 can be used also as a source of pronunciation by impressing the sound signal of an audible band to the 5th in the oscillating actuators 950-952 at a coil 962. Thus, if the tremulor and the source of pronunciation can be made to serve a double purpose, in small electronic equipment, the installation tooth space of a component part can be saved especially sharply.

[0277] In addition, although the oscillating actuators 950-952 shown in example [1st] - the 3rd example of this operation gestalt were considered as the configuration sealed by case 115a which has the antimagnetic effectiveness, they do not need to be sealed in such a case 961. Moreover, the spring 966 which supports the movable spindle 963 may be connected with the vibrated body not the case 961 but directly.

[0278] [-- N. -- modification] -- although the operation gestalt of this invention was explained above, this operation gestalt is instantiation to the last, and various deformation is possible for it in the range which does not deviate from the meaning of this invention. As a modification, the following can be considered, for example.

[0279] In the 1st operation gestalt of the [modification 1] above, two or more kinds of data points are stored in memory 112, and CPU113 is good also as a configuration which reads the data point beforehand specified by the actuation input from a user among two or more kinds of data points, and drives the oscillating actuator 115. More variations can be given to the gestalt of such a configuration, then vibration used in the case of information. For example, vibration periods, the magnitude of vibration, the period of the strength of vibration, etc. can be changed into arbitration.

[0280] Moreover, the sample data of a drive signal wave form is stored in memory 112, and the driving signal generation circuit 114 is good for it by carrying out D/A (Digital/Analog) conversion of this sample data also as a configuration which generates a driving signal.

[0281] In the [modification 2] above 1st - the 3rd operation gestalt, it is still better also considering effective/invalid of the information function by vibration as a configuration which a user can specify. In this case, CPU113 performs a screen display for making a user specify whether the information function by vibration is enabled, or it considers as an invalid. CPU113 will set the value of the oscillating flag

in memory 112 to "0" (invalid) or "1" (effective) according to the contents of assignment, if effective or an invalid is specified by the actuation input from a user. And CPU113 determines whether perform oscillating information according to the value of an oscillating flag, when the actuation input from a touch panel 102 or the actuation keys 104a-104c is detected.

[0282] It is installed in a lighting-facilities body and the distant location, and this invention may be applied to the control panel 990 for inputting operator command into a facility body so that it may be shown in [a modification 3, for example, drawing 78 ,]. The control panel 990 shown in this drawing is installed in an indoor wall surface. The tremulor 991, such as the oscillating actuator 115, is formed in the rear face of this control panel 990. Moreover, although illustration is omitted, in the control unit which controls a lighting-facilities body, control of oscillating information including the drive of the tremulor 991 is performed.

[0283] If a user switches lighting/putting-out-lights key 992 of this control panel 990 by the fingertip, a control unit will drive the tremulor 991 and will give vibration to the fingertip of the user who is touching lighting/putting-out-lights key 992. Moreover, these lighting facilities can carry out adjustable [of the quantity of light of lighting] to ** continuously between dark. If a user operates the slider switch 993 for directing the quantity of light of this lighting to a control device by the fingertip, vibration of the magnitude according to the quantity of light of the lighting changed by this actuation will be given to the fingertip of the user who is operating the slider switch 993. In addition, you may be a configuration using Pulaski 995 and the minus key 996 which are shown in the dial mold switch 994 shown in drawing 79 which has the same function as this slider switch 993 instead of and drawing 80 . [the slider switch 993]

[0284] Moreover, as shown in drawing 81 , of course, this invention can apply the remote controller of television or video etc. also to electronic equipment without neither a touch panel nor a display. What is necessary is just to consider having received the input from an actuation key as the configuration which an actuation key and a case are vibrated and is reported to a user in the case of such electronic equipment.

[0285] In the [modification 4] above 1st - the 12th operation gestalt, the direction of vibration generated from tremulor, such as an oscillating actuator and vibrator, is not limited in the direction which becomes perpendicular to the front face of a touch panel, and the direction of a depression of an actuation key. Moreover, the frequency of the driving signal impressed to an oscillating actuator is not limited to the frequency which resonates the liquid crystal display panel possessing the case and touch panel of electronic equipment, or a touch panel, and the oscillating actuator itself. It is not limited to the driver voltage which makes the engine speed of driver voltage impressed to vibrator of a DC motor similarly correspond with the resonant frequency of vibrator the liquid crystal display panel possessing the case and touch panel of electronic

equipment, or a touch panel, and own.

[0286] In the [modification 5] above 1st - the 12th operation gestalt, the tremulor is not limited to the vibrator which has a linear oscillating actuator and an eccentric spindle. For example, the tremulor using a piezoelectric device etc. may be used.

[0287] Moreover, each operation gestalt except the 2nd operation gestalt explained the linear oscillating actuator which used the permanent magnet as a movable spindle. Here, the moderate mass which is needed in order to generate vibration, and the device in which the movement force for the movable spindle concerned to reciprocate is acquired are needed for a movable spindle. With each above-mentioned operation gestalt, the permanent magnet was used as a device in which moderate mass and the movement force are acquired. However, this movable spindle may be the configuration that the permanent magnet is built into a part of member as a spindle. Moreover, a permanent magnet may be fixed to the interior of the case of a linear oscillating actuator, and you may be a gestalt using a coil as a movable spindle. Moreover, a coil may be fixed to the interior of a case and you may be a gestalt using another coil as a movable spindle. What is necessary is just to consider as the configuration using a coil as some spindles which have moderate mass, when there is not sufficient mass for the coil which is naturally used as a movable spindle in such a case. Furthermore, a linear oscillating actuator may be a linear oscillating actuator of an iron core ejector half.

[0288] Moreover, an oscillating actuator may be an oscillating actuator using electrostatic force of the so-called electrostatic type. Drawing 82 is drawing for explaining the oscillating actuator 800 of the electrostatic type concerning the 1st example of this modification. In this drawing, the oscillating actuator 800 has the movable spindle 803 (pyramid of medulla oblongata) with which the electrode 802 was formed in the case 801 interior, the electrode 804 prepared in case 801 wall, and a spring 805. In addition, in this drawing, the vibrated body shall be prepared in the location which counters on both sides of a case 801 to an electrode 804.

[0289] The movable spindle 803 is a cylinder-like spindle and the circular ring-like electrode 802 is formed in the base. This movable spindle 803 is in the condition in which a reciprocating motion linear in the vertical direction is possible among drawing, and is supported with the spring 805 by the space formed in the case 801 interior. As this spring 805 is shown in this drawing, one edge is tied to the case 801 (base member) which touches the vibrated body, and the other end is tied to the movable spindle 803. In addition, the movable spindle 803 except an electrode 802 should just be a spindle which has moderate mass. Moreover, the circular ring-like electrode 804 is formed in the internal surface of an electrode 802 and the case 801 which counters.

[0290] The constant potential of plus or minus is always impressed to this electrode 804 from the exterior of the oscillating actuator 800 at the time of the drive of the oscillating actuator 800 concerned. On the other hand, the alternating voltage (driving signal) which sways by turns to plus and minus is impressed to the electrode 802 of

the movable spindle 803 through amplifier 810 from the exterior of the oscillating actuator 800.

[0291] Here, when the potential of an electrode 802 and an electrode 803 becomes a like pole, i.e., plus and plus, or minus, and minus mutually, the movable spindle 803 moves the charge of this agreement to above among drawing with the property of the electrostatic force of opposing mutually. On the other hand, when the potential of an electrode 802 and an electrode 803 becomes a unlike pole, i.e., plus and minus, mutually, the movable spindle 803 moves the charge of different agreement to down among drawing with the property of the electrostatic force of drawing in mutually.

[0292] Thus, as for the oscillating actuator 800 concerning this modification, the movable spindle 803 performs a linear reciprocating motion in the vertical direction among drawing according to electrostatic force. And vibration acceleration arises as reaction force of a reciprocating motion of this movable spindle 803 into case 801 part to which the spring 805 was tied, and vibration gets across to the vibrated body. In addition, although the oscillating component transmitted from the movable spindle 803 through a spring 805 joins case 801 part to which the spring 805 was tied besides the reaction force of this reciprocating motion with the reciprocating motion of the movable spindle 803, the base of the oscillating generating principle in this oscillating actuator 800 is to use the vibration acceleration produced as reaction force of a reciprocating motion of the movable spindle 803 like the oscillating actuator 115 explained with the above-mentioned 1st operation gestalt.

[0293] Moreover, drawing 83 is drawing for explaining the oscillating actuator 850 of the electrostatic type concerning the 2nd example of this modification. Like the oscillating actuator 800 shown in drawing 82 also as a configuration as shown in this drawing, the movable spindle 813 reciprocates according to electrostatic force, and vibration occurs. Moreover, when this oscillating actuator 850 has a total of two pairs of counterelectrodes of electrode 812a, electrode 814a, and electrode 812b and electrode 814b and between one counterelectrodes is in the condition of repulsion, between the counterelectrodes of another side will be in the condition of suction. Therefore, as compared with the oscillating actuator 800 shown in drawing 82 , the electrostatic force which makes the movable spindle 813 reciprocate can become twice, and a bigger vibration can be generated.

[0294] In addition, you may also include the brake mechanism further explained by the 1st example of the above-mentioned 13th operation gestalt, and the 2nd example in the oscillating actuator 800,850 of the electrostatic type shown in drawing 82 and drawing 83 . Moreover, the wave configuration of an electrode or a driving signal etc. is not limited to what was shown in drawing 82 and drawing 83 .

[0295] [Modification 6] In an oscillating actuator, the supporter material which supports a movable spindle possible [a reciprocating motion] in the air is limited to neither a spring nor string-like rubber again. For example, supporter material may be

the guide rail 967 as shown in drawing 84 . In this drawing, the hole penetrated in the vertical direction is established in the center section among drawing at movable spindle 963a. As a guide rail 967 penetrates the hole of movable spindle 963a, it is prepared, and the end is being fixed to the case 961 where the vibrated body touches. Even if it uses such a guide rail 967, movable spindle 963a can be supported possible [a reciprocating motion] in the air by the magnetism generated from coil 962a. Moreover, this guide rail 967 limits the movement direction of movable spindle 963a, and is also bearing the role to which a linear reciprocating motion is made to carry out.

[0296] In the [modification 7] above 1st - the 12th operation gestalt, the control unit vibrated with the tremulor is limited to neither a touch panel nor an actuation key. For example, you may be various pointing devices, such as the keyboard itself which has two or more actuation keys, and a mouse, a trackpad, a tablet. Moreover, a touch panel various type [, such as an optical coupling mold, a resistance mold, a contact mold, a magnetic coupling mold, and a capacity-coupling mold,] can be used.

[0297] The 1st operation gestalt [of the [modification 8] above] - 12th operation gestalt explained the case where this invention was applied to PDA or ATM. However, this invention of the ability to apply to various pocket mold electronic equipment, such as a remote controller of a portable telephone, an electronic notebook, a mobile mold computer, a wrist watch, a calculator, and electronic equipment, is natural. Furthermore, this invention is applicable also to various electronic equipment which does not have portability, such as a computer of a deferment mold, and an automatic vending machine, a cash register, car navigation equipment, home electronics.

[0298] In addition, in the electronic equipment which does not have portability, while a user grasps the electronic equipment concerned by one hand, it is hard to assume the use gestalt of performing an actuation input by the hand of another side. Therefore, what is necessary is just to consider as the configuration which vibrates some cases assumed that some a user's bodies will contact or contact at the time of actuation, in vibrating parts other than a control unit in such electronic equipment.

[0299] For example, drawing 85 is a perspective view which illustrates the appearance of ATM150 concerning this modification. In this drawing, on the console 151 of ATM150, the liquid crystal display panel 153 which the touch panel 152 of transparence piled up attends opening, and is prepared. A user stands in front of a console 151, and performs touch actuation to a touch panel 152. In addition, on the console 151, the bill close payment opening 154 and the coin-tray payment opening 155 other than a touch panel 152 are prepared. Moreover, the passbook insertion opening 156 and a card slot 157 are formed in the side face of the transverse-plane upper part of ATM150.

[0300] When a user performs touch actuation to such ATM150, it can assume that different another [from the hand of performing touch actuation] hand has set to desk field 151a of a console 151, or desk field 151b etc. Therefore, the control section of

ATM150 drives the tremulor which omitted illustration according to the detection of touch actuation to a touch panel 152, and should just be taken as the configuration which vibrates desk field 151a or desk field 151b. Moreover, when the user is performing touch actuation similarly, it can assume that a user's femoral region and a part of fuselage touch the table edge material 158 prepared before this console 151. Therefore, the control section of ATM150 should just be taken as the configuration which vibrates this table edge material 158 according to the detection of touch actuation to a touch panel 152.

[0301]

[Effect of the Invention] As explained above, according to this invention, electronic equipment can report the response to that the actuation input was received or an actuation input to a user by vibration. Even if a user does not look at a screen display, he can check the response result of the electronic equipment to the reception existence of an actuation input, or an actuation input by vibration.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view which illustrates the appearance of PDA concerning the 1st operation gestalt of this invention.

[Drawing 2] It is the block diagram which illustrates the hardware configuration of PDA concerning this operation gestalt.

[Drawing 3] It is the sectional view which illustrates the installation condition of an oscillating actuator typically in the body case of PDA concerning this operation gestalt.

[Drawing 4] It is drawing which illustrates the wave of the driving signal impressed to the oscillating actuator concerning this operation gestalt.

[Drawing 5] In PDA concerning this operation gestalt, it is a flow chart explaining actuation of the oscillating control processing 1 performed by CPU.

[Drawing 6] It is the block diagram which illustrates the hardware configuration of PDA concerning the 2nd operation gestalt of this invention.

[Drawing 7] It is the sectional view which illustrates the installation condition of vibrator typically in the body case of PDA concerning this operation gestalt.

[Drawing 8] It is the perspective view which illustrates the appearance of the DC motor concerning this operation gestalt.

[Drawing 9] It is drawing illustrated about the wave of the driver voltage impressed to the vibrator concerning this operation gestalt.

[Drawing 10] It is drawing illustrated about vibration produced on the front face of the

touch panel concerning this operation gestalt.

[Drawing 11] In PDA concerning this operation gestalt, it is a flow chart explaining actuation of the oscillating control processing 2 performed by CPU.

[Drawing 12] It is the perspective view which illustrates the appearance of PDA concerning the 3rd operation gestalt of this invention.

[Drawing 13] It is the block diagram which illustrates the hardware configuration of PDA concerning this operation gestalt.

[Drawing 14] In PDA concerning this operation gestalt, it is a flow chart explaining actuation of the oscillating control processing 3 performed by CPU.

[Drawing 15] In PDA concerning this operation gestalt, it is a flow chart explaining actuation of the oscillating control processing 4 performed by CPU.

[Drawing 16] It is drawing which illustrates the internal structure of PDA concerning the 4th operation gestalt of this invention.

[Drawing 17] It is the block diagram which illustrates the hardware configuration of PDA concerning this operation gestalt.

[Drawing 18] In PDA concerning this operation gestalt, it is a flow chart explaining actuation of the oscillating control processing 5 performed by CPU.

[Drawing 19] It is the sectional view which illustrates the internal structure of PDA concerning the 1st modification of this operation gestalt.

[Drawing 20] It is drawing showing other examples of installation of the elastic member concerning this modification.

[Drawing 21] It is drawing showing the example of installation of others of the elastic member concerning this modification.

[Drawing 22] It is drawing showing the example of installation of others of the elastic member concerning this modification.

[Drawing 23] It is drawing which illustrates the internal structure of PDA concerning the 2nd modification of this operation gestalt.

[Drawing 24] It is drawing which illustrates the internal structure of PDA concerning the 3rd modification of this operation gestalt.

[Drawing 25] It is a sectional view for explaining the internal structure of ATM concerning the 5th operation gestalt of this invention.

[Drawing 26] It is the sectional view showing the modification of the installation location of the oscillating actuator concerning this operation gestalt.

[Drawing 27] It is the sectional view which illustrates the internal structure of ATM concerning the 1st modification of this operation gestalt.

[Drawing 28] It is drawing which illustrates the internal structure of ATM concerning the 2nd modification of this operation gestalt.

[Drawing 29] It is drawing which illustrates the internal structure of ATM concerning the 3rd modification of this operation gestalt.

[Drawing 30] It is drawing which illustrates the internal structure of ATM concerning

the 4th modification of this operation gestalt.

[Drawing 31] It is drawing which illustrates the internal structure of ATM concerning the 5th modification of this operation gestalt.

[Drawing 32] It is drawing showing the example of a screen display of PDA concerning the 1st example of the 6th operation gestalt of this invention.

[Drawing 33] In PDA concerning the 1st example of this operation gestalt, it is drawing which illustrates the wave data table stored in memory.

[Drawing 34] In PDA concerning the 1st example of this operation gestalt, it is drawing which illustrates the wave of the driving signal impressed to an oscillating actuator.

[Drawing 35] In PDA concerning the 1st example of this operation gestalt, it is drawing which illustrates the wave of the driving signal impressed to an oscillating actuator.

[Drawing 36] In PDA concerning the 1st example of this operation gestalt, it is drawing which illustrates the wave of the driving signal impressed to an oscillating actuator.

[Drawing 37] In PDA concerning the 1st example of this operation gestalt, it is drawing which illustrates the wave of the driving signal impressed to an oscillating actuator.

[Drawing 38] It is drawing showing the example of a screen display of PDA concerning the 2nd example of this operation gestalt.

[Drawing 39] It is drawing showing the example of a screen display of PDA concerning the 2nd example of this operation gestalt.

[Drawing 40] In PDA concerning the 2nd example of this operation gestalt, it is drawing which illustrates the wave data table stored in memory.

[Drawing 41] It is drawing showing the example of a screen display of PDA concerning the 3rd example of this operation gestalt.

[Drawing 42] In PDA concerning the 3rd example of this operation gestalt, it is drawing which illustrates the wave data table stored in memory.

[Drawing 43] In PDA concerning the 3rd example of this operation gestalt, it is drawing which illustrates the wave of the driving signal impressed to an oscillating actuator.

[Drawing 44] In PDA concerning the 3rd example of this operation gestalt, it is drawing which illustrates the wave of the driving signal impressed to an oscillating actuator.

[Drawing 45] In PDA concerning the 3rd example of this operation gestalt, it is drawing which illustrates the wave of the driving signal impressed to an oscillating actuator.

[Drawing 46] In PDA concerning the 7th operation gestalt of this invention, it is drawing which illustrates the wave data table stored in memory.

[Drawing 47] It is the block diagram which illustrates the hardware configuration of PDA concerning the 8th operation gestalt of this invention.

[Drawing 48] In PDA concerning this operation gestalt, it is a flow chart explaining actuation of the information control processing 1 performed by CPU.

[Drawing 49] In PDA concerning this operation gestalt, it is drawing which illustrates the wave of the driving signal for vibration impressed to an oscillating actuator.

[Drawing 50] In PDA concerning this operation gestalt, it is drawing which illustrates

the wave of the driving signal for beep sounds impressed to an oscillating actuator.

[Drawing 51] In PDA concerning this operation gestalt, when performing information by vibration and the beep sound to coincidence, it is drawing which illustrates the wave of the driving signal impressed to an oscillating actuator.

[Drawing 52] It is the block diagram which illustrates the hardware configuration of PDA concerning the 9th operation gestalt of this invention.

[Drawing 53] In PDA concerning this operation gestalt, it is a flow chart explaining actuation of the beacon reception performed by CPU.

[Drawing 54] In PDA concerning the 10th operation gestalt of this invention, it is drawing which illustrates the information mode judging table stored in memory.

[Drawing 55] It is drawing for explaining ATM concerning the 11th operation gestalt of this invention.

[Drawing 56] It is the block diagram which illustrates the hardware configuration of ATM concerning this operation gestalt.

[Drawing 57] In ATM concerning this operation gestalt, it is a part of flow chart explaining actuation of the oscillating control processing 6 performed by CPU.

[Drawing 58] In ATM concerning this operation gestalt, it is a part of flow chart explaining actuation of the oscillating control processing 6 performed by CPU.

[Drawing 59] It is a sectional view for explaining the touch panel of ATM concerning the modification of this operation gestalt.

[Drawing 60] It is a sectional view for explaining the touch panel of ATM concerning the modification of this operation gestalt.

[Drawing 61] It is drawing for explaining ATM concerning the 12th operation gestalt of this invention.

[Drawing 62] In ATM concerning this operation gestalt, it is drawing which illustrates the drive place judging table stored in memory.

[Drawing 63] In ATM concerning this operation gestalt, it is a flow chart explaining actuation of the oscillating control processing 7 performed by CPU.

[Drawing 64] It is the sectional view which illustrates the internal structure of the oscillating actuator concerning the 1st example of the 13th operation gestalt of this invention.

[Drawing 65] In the oscillating actuator concerning the 1st example of this operation gestalt, it is the top view showing the example of arrangement of a brake member.

[Drawing 66] In the oscillating actuator concerning the 1st example of this operation gestalt, it is the top view showing other examples of arrangement of a brake member.

[Drawing 67] In the oscillating actuator concerning the 1st example of this operation gestalt, it is the top view showing the example of arrangement of others of a brake member.

[Drawing 68] It is drawing which illustrates the wave of the driving signal impressed to the coil of the oscillating actuator concerning the 1st example of this operation gestalt.

[Drawing 69] It is drawing for explaining the reciprocating motion of the movable spindle of an oscillating actuator without a brake mechanism.

[Drawing 70] It is drawing for explaining the reciprocating motion of the movable spindle of the oscillating actuator concerning the 1st example of this operation gestalt.

[Drawing 71] It is the sectional view which illustrates the internal structure of the oscillating actuator concerning the 2nd example of this operation gestalt.

[Drawing 72] It is drawing which illustrates the circuitry for impressing a driving signal to the coil and the coil for brakes of an oscillating actuator concerning the 2nd example of this operation gestalt.

[Drawing 73] It is drawing which illustrates the wave of the driving signal impressed to the coil of the oscillating actuator concerning the 2nd example of this operation gestalt.

[Drawing 74] It is drawing which illustrates the wave of the driving signal impressed to the coil for brakes of the oscillating actuator concerning the 2nd example of this operation gestalt.

[Drawing 75] It is the sectional view which illustrates the internal structure of the oscillating actuator concerning the 3rd example of this operation gestalt.

[Drawing 76] It is drawing which illustrates the circuitry for impressing a driving signal to the coil of the oscillating actuator concerning the 3rd example of this operation gestalt.

[Drawing 77] It is drawing which illustrates the wave of the CTRL signal supplied to the switching circuit concerning the 3rd example of this operation gestalt.

[Drawing 78] It is drawing illustrated about the control panel concerning the modification 3 of this invention.

[Drawing 79] It is drawing which illustrates the dial type switch concerning this modification.

[Drawing 80] It is drawing which illustrates the "+" key and the "−" key concerning this modification.

[Drawing 81] It is the perspective view which illustrates the appearance of the remote controller of the electronic equipment concerning this modification.

[Drawing 82] It is drawing for explaining the oscillating actuator of the electrostatic type concerning the modification 5 of this invention.

[Drawing 83] It is drawing for explaining the oscillating actuator of other electrostatic types concerning the modification 5 of this invention.

[Drawing 84] It is the sectional view which illustrates the internal structure of the oscillating actuator concerning the modification 6 of this invention.

[Drawing 85] It is the perspective view which illustrates the appearance of ATM concerning the modification 8 of this invention.

[Description of Notations]

60 10, 20, 30, 40–43, 70 .... PDA, 50–55, 90,150 ..ATM, 50a .... The main frame,

101,301,401,401a .. Body case, 102,152,502 .... A touch panel, 103,302,901 .. Display, 103a, 302a, 153,501 .... A liquid crystal display panel, 104a, 104b, 104c .. Actuation key, 111,303 .... The key input section, 112,902 .. Memory, 112a-112d .. Wave data table, 112e .... An information mode judging table, 113,904 .. CPU, 114,211,903 .... A driving signal generation circuit, 115,115a-115c, 800,850,950-953 .. Oscillating actuator, 115a, 801,811,961 .... A case, 121, 962, 962a .. Coil, 122 803,813,963,963a .... A movable spindle, 123, 805, 815a, 815b, 966 .... A spring, 212 .. Vibrator, 213 .. Encoder, 221 [.. Body covering,] .... A revolving shaft, 222 .. An eccentric spindle, 223 .. A DC motor, 150a 151 .... A console, 151a, 151b .. A desk field, 158 .. Table edge material, 304,701 .... The Radio Communications Department, 411 .. A touch sensor, 451,451a-451f .. Elastic member, 503 [.. Microphone,] .... A damper, 504 .. Body covering, 550 .. A deformation layer, 601 602 .... A sound-volume measuring circuit, 603 .. A beep sound generation circuit, 604 .. Loudspeaker, 802,804,812a, 812b, 814a, 814b .... Electrode, a 810 -- amplifier and 964,964a- 964c and 971 .... a brake member -- 965.965a-965c .... A brush, 967 .. Guide rail, 971a [.. A spring, 974 / .. An oscillator, 975 / .. A brake control circuit, 981 / .. A control circuit, 982 / .. A switching circuit, 990 / .. A control panel, 991 / .. Tremulor.] .... A brake side, 971b .. A magnet, 972 .. The coil for brakes, 973